P2X0-1090-10ENZ0

ETERNUS Web GUI User's Guide

ETERNUS DX80 S2/DX90 S2,
ETERNUS DX410 S2/DX440 S2,
ETERNUS DX8100 S2/DX8700 S2

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Preface

This manual provides a variety of basic information about Web GUI for the ETERNUS DX80 S2/DX90 S2, the ETERNUS DX410 S2/DX440 S2, and the ETERNUS DX8100 S2/DX8700 S2. It should be referred to when setting up and maintaining the ETERNUS DX80 S2/DX90 S2, the ETERNUS DX410 S2/DX440 S2, and the ETERNUS DX8100 S2/DX8700 S2 Disk storage systems.
Knowledge of UNIX or Windows® system management is required.

This manual is written for controller firmware version V10L50 or later. Some of the functions herein may not be supported for firmware version V10L4x or earlier.

Tenth Edition
June 2013

Structure of This Manual

This manual consists of the following 11 chapters and ten appendices.

- Chapter 1 Outline

  This chapter describes the ETERNUS DX80 S2/DX90 S2, the ETERNUS DX410 S2/DX440 S2, and the ETERNUS DX8100 S2/DX8700 S2 Web GUI outlines, features, operation environment, user management function, and operation screens for Web GUI.

- Chapter 2 Startup and Shutdown

  This chapter describes how to start, exit, log in and log out from Web GUI.

- Chapter 3 Initial Setup

  This chapter describes the initial settings for the ETERNUS DX80 S2/DX90 S2, the ETERNUS DX410 S2/DX440 S2, and the ETERNUS DX8100 S2/DX8700 S2.

- Chapter 4 Configuration Settings

  This chapter describes the configuration settings for using Standard volumes and Thin Provisioning functions.

- Chapter 5 Volume Management

  This chapter describes volume status and management.

- Chapter 6 RAID Group Management

  This chapter describes RAID group status and management.

- Chapter 7 Thin Provisioning Pool Management

  This chapter describes Thin Provisioning Pool status and management.

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- **Chapter 8 Advanced Copy Management**

  This chapter describes Advanced Copy status and management.

- **Chapter 9 Connectivity Management**

  This chapter describes connectivity settings between the host and the ETERNUS DX80 S2/DX90 S2, the ETERNUS DX410 S2/DX440 S2, and the ETERNUS DX8100 S2/DX8700 S2.

- **Chapter 10 Component Management**

  This chapter describes component status in the ETERNUS DX80 S2/DX90 S2, the ETERNUS DX410 S2/DX440 S2, and the ETERNUS DX8100 S2/DX8700 S2 and hardware maintenance.

- **Chapter 11 System Management**

  This chapter describes system status and management.

The following items are provided in the appendices.

- User Roles and Policies
- Status List
- Installing the Security Certificate
- Naming Conventions of Volumes and Hosts
- Basic Size and MWC Input Condition for RAID Groups
- Automatic Controlling CM-CPU Setting
- Using RADIUS Authentication
- Estimated Advanced Copy Source Capacity
- Storage Migration Setting Files
- Factory Default List
- Error Code

Latest Information

The information in this manual is subject to change without notice for functionality expansion and improvement of the ETERNUS DX80 S2/DX90 S2, the ETERNUS DX410 S2/DX440 S2, and the ETERNUS DX8100 S2/DX8700 S2 Disk storage systems. The latest version of this manual and the latest information of the ETERNUS DX80 S2/DX90 S2, the ETERNUS DX410 S2/DX440 S2, and the ETERNUS DX8100 S2/DX8700 S2 Disk storage systems are released in the following web-site. Access the following address if needed.

http://www.fujitsu.com/global/services/computing/storage/eternus/documentation/

Related Documents

Other manuals for the ETERNUS DX80 S2/DX90 S2, the ETERNUS DX410 S2/DX440 S2, and the ETERNUS DX8100 S2/DX8700 S2 are as follows:

- ETERNUS DX80 S2/DX90 S2 Disk storage system Overview
- ETERNUS DX80 S2/DX90 S2 Disk storage system User's Guide -Site Planning-
- ETERNUS DX80 S2/DX90 S2 Disk storage system User's Guide -Installation-
- ETERNUS DX80 S2/DX90 S2 Disk storage system User's Guide -Operation-
- ETERNUS DX410 S2/DX440 S2 Disk storage system Overview
- ETERNUS DX410 S2/DX440 S2 Disk storage system User's Guide -Site Planning-
- ETERNUS DX410 S2/DX440 S2 Disk storage system User's Guide -Installation & Operation-
- ETERNUS DX8100 S2/DX8700 S2 Disk storage system User’s Guide
- ETERNUS CLI User's Guide ETERNUS DX80 S2/DX90 S2, ETERNUS DX410 S2/DX440 S2, ETERNUS DX8100 S2/DX8700 S2
- ETERNUS DX Disk storage systems User's Guide -Server Connection- (*1)
- ETERNUS SF KM V2.0.1 Overview
- ETERNUS SF KM V2.0.1 Scenarios
- ETERNUS SF KM V2.0.1 Planning
- ETERNUS SF KM V2.0.1 Installing
- ETERNUS SF KM V2.0.1 Administering
- ETERNUS SF KM V2.0.1 Reference
- ETERNUS SF KM V2.0.1 Glossary
- ETERNUS SF KM V2.0.1 Installation and Configuration Guide
- ETERNUS SF KM V2.0.1 Quick Start Guide
- ETERNUS SF KM V2.0.1 Notes
- ETERNUS SF KM V2.0.1.3 Procedure for Applying Fix Pack

*1: Download the required manuals for your system environment (for server OS, host interface type, etc.) from the specified web site. Refer to the Documentation CD provided with the ETERNUS DX80 S2/DX90 S2, the ETERNUS DX410 S2/DX440 S2, and the ETERNUS DX8100 S2/DX8700 S2 Disk storage system for URLs of the manual download site.

Acknowledgments

Naming Conventions

Product names

The following products will be represented throughout this manual by the following abbreviations.

- The following abbreviations are used for Microsoft® Windows Server®.

Product name	Abbreviation
Microsoft® Windows Server® 2003, Datacenter Edition	Windows Server 2003
Microsoft® Windows Server® 2003, Enterprise Edition	
Microsoft® Windows Server® 2003, Standard Edition	
Microsoft® Windows Server® 2008 Datacenter	Windows Server 2008
Microsoft® Windows Server® 2008 Enterprise	
Microsoft® Windows Server® 2008 Standard	
Microsoft® Windows Server® 2008 for Itanium-Based Systems	
Microsoft® Windows Server® 2008 HPC Edition	
Microsoft® Windows Server® 2008 R2 Datacenter	Windows Server 2008 R2
Microsoft® Windows Server® 2008 R2 Enterprise	
Microsoft® Windows Server® 2008 R2 Standard	
Microsoft® Windows Server® 2008 R2 for Itanium-Based Systems	
Microsoft® Windows Server® 2008 R2 HPC Edition	
Microsoft® Windows Server® 2012 Datacenter	Windows Server 2012
Microsoft® Windows Server® 2012 Standard	
Microsoft® Windows Server® 2012 Essentials	
Microsoft® Windows Server® 2012 Foundation	

- Oracle Solaris might be described as Solaris, Solaris Operating System, or Solaris OS.
- Trademark symbols such as ™ and ® are omitted in this document.

Units in this manual

Except as otherwise noted, the following units are used in this manual:

- Drive capacity assume that 1KB = 1000 bytes, 1MB = 1000KB, 1GB = 1000MB, and 1TB = 1000GB (example: "600GB drive").
- Other capacities (such as for RAID Groups and volumes) assume that 1KB = 1024 bytes, 1MB = 1024KB, 1GB = 1024MB, and 1TB = 1024GB.

Note that the screen shots in this manual were captured during development of the software and the actual screens may be different.

Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation.

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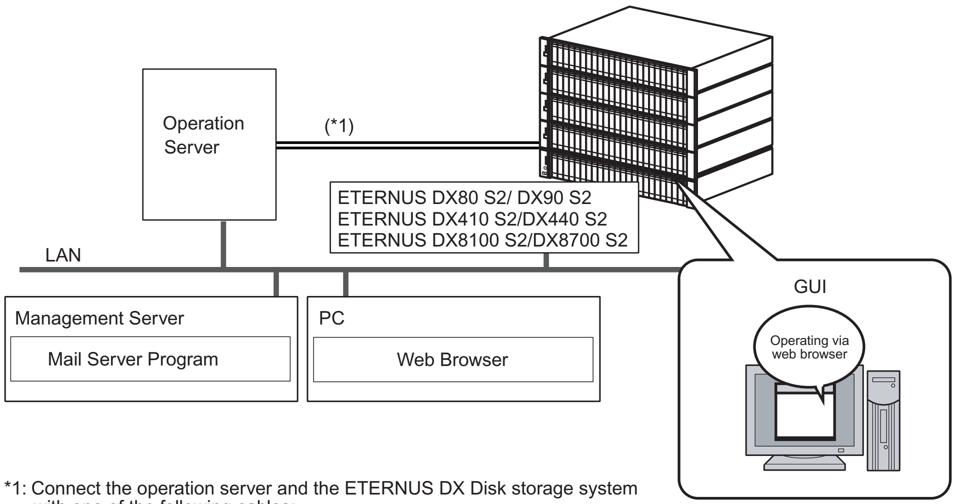
Chapter 1
Outline

This chapter describes the outlines, features, operating environment, user management function, and operation screens for ETERNUS DX Disk storage system Web GUI (hereinafter referred to as "GUI").
GUI is installed in controllers of the ETERNUS DX Disk storage systems (hereinafter also referred to as "ETERNUS DX Disk storage system" or "the storage system"), and used for performing settings and maintenance via web browser.

1.1 Outline

Use GUI to set the operating environment and check status for the ETERNUS DX Disk storage system.
GUI can be operated from a web browser by connecting the PC via a LAN connection.

Figure 1.1 Outline of GUI



*1: Connect the operation server and the ETERNUS DX Disk storage system with one of the following cables:
- Fibre Channel (FC) cable
- LAN cable
- SAS cable (available only for the ETERNUS DX80S2/DX90 S2)

Refer to "Chapter 2 Startup and Shutdown" (page 32) for details of GUI start up.

1.2 Features

The features for GUI are as follows:

- Initial settings by the wizard

  The wizard provides instructions for the basic settings that are required to run the ETERNUS DX Disk storage system.

- Status Display

  This function displays the storage system installation image.

- Checking the extent of a failure

  If a drive failure occurs, host port, LUN group, volume, RAID group, and installation location can be referenced to determine the extent of the failure.

- Easy operation

  If a hardware failure is detected, the system administrator can receive a mail containing detected failure information.

1.3 Operating Environment

The following PC environment is required to use GUI.

Confirmed operating environment		Version
Web browser	Microsoft Internet Explorer	7.0, 8.0, 9.0, 10.0 (desktop version)
	Mozilla Firefox	3.6.x, ESR 10.0.x, ESR 17.0.x
Display resolution	• 1024 × 768 or more • 24-bit color or more is recommended	-

Caution

- Note the following:
  - Set "Do not use proxy server" as the proxy setting
  - Configure the temporary file (cache) setting of pages so that the pages are updated every time the browser is started
    For example, when using Internet Explorer 7.0, select "Every time I start Internet Explorer".
  - Enable the Java Script setting
  - When Auto Reading of pages is available, enable the setting

- Furthermore, when using GUI with Microsoft Internet Explorer 7.0, note the following:
  - [Automatic prompting for file downloads] and [Allow websites to open windows without address or status bars] must be enabled. Click the [Custom Level] button under the Internet Options Security tab and select the radio buttons for both of these items.
  - [Show friendly HTTP error messages] must be disabled. Click the Internet Options Advanced tab and clear the [Show friendly HTTP error messages] checkbox.
- Furthermore, when using GUI with Microsoft Internet Explorer 8.0, note the following:
  - [Automatic prompting for file downloads] and [Allow websites to open windows without address or status bars] must be enabled. Click the [Custom Level] button under the Internet Options Security tab and select the radio buttons for both of these items.
  - The SmartScreen Filter function must be disabled. If the SmartScreen Filter function is enabled, click the [Custom Level] button under the Internet Options Security tab and disable [Use SmartScreen Filter].
  - Set the following items for [Display intranet sites in Compatibility View] under the Tools tab.
    - If an address for the ETERNUS DX Disk storage system is registered in the [Websites you've added to Compatibility View.] field, select and then delete the address
    - Clear the [Display intranet sites in Compatibility View] checkbox
    - Clear the [Display all websites in Compatibility View] checkbox
- Furthermore, when using GUI with Microsoft Internet Explorer 9.0 or Microsoft Internet Explorer 10.0 (desktop version), note the following:
  - [Allow websites to open windows without address or status bars] must be enabled. Click the [Custom Level] button under the Internet Options Security tab and select the [Allow websites to open windows without address or status bars] radio button.
  - The SmartScreen Filter function must be disabled. If the SmartScreen Filter function is enabled, click the [Custom Level] button under the Internet Options Security tab and disable [Use SmartScreen Filter].
  - Set the following items for [Display intranet sites in Compatibility View] under the Tools tab.
    - If an address for the ETERNUS DX Disk storage system is registered in the [Websites you've added to Compatibility View.] field, select and then delete the address
    - Clear the [Display intranet sites in Compatibility View] checkbox
    - Clear the [Display all websites in Compatibility View] checkbox
  - When using SSL (https), note the following:
    - On the Internet Options Advanced tab, scroll to Security, and select [Use SSL3.0] or [Use TLS1.0].
    - On the Internet Options Advanced tab, scroll to Security, and clear the [Do not save encrypted pages to disk] checkbox.
- If the PC and the ETERNUS DX Disk storage system belong to a different network and the transfer rate setting for each network does not match, the retransmission of packets occur more frequently and the operation screen for GUI may take more time to display.
  By setting the same transfer rate for each network, the retransmission of packets can be reduced. Note the following points when setting the transfer rate:
  - Set the same transfer rate for each network
  - When the transfer rate for the ETERNUS DX Disk storage system is not "Auto-negotiation", the same transfer rate must also be set for the network switches
- Do not use the standard buttons of each browser (for example, the [Back] button, the [Forward] button, and the [Refresh] button), the [F5] (refresh) key, or the [Back Space] (back) key.

1.4 User Management

Appropriate user management is important to ensure that security is maintained within the system.
The user management function applies roles with multiple policies when user accounts are created to specify the functions that are allowed for each user.
The following table shows the difference between user roles.

Default role	Available functions	Default account
Admin	"Admin" is a system administrator privilege. Functions such as status display and configuration management are available.	root
Maintainer	"Maintainer" is a maintenance engineer privilege. Setting maintenance such as status display, configuration management, and maintenance functions are available.	f.ce
Monitor	"Monitor" is a general user privilege. Only the status display function is available.	None

Operation mistakes and maintenance worker hours can be reduced and storage system security can be improved by placing the authorized functions of system administrators in units of usage and by only giving the minimum necessary policies to system administrators.

Note

Refer to "Appendix A User Roles and Policies" (page 948) for details about user roles and policies.

1.5 Screen Operations

This section provides a description about GUI screen operations.
Click the [?] icon or the [Help] link for a detailed explanation of the functions used during operation. An explanation (help) screen of the function is displayed.

Caution

- Be sure to log out after all necessary operations are completed.
- If the operation screen is not updated when accessing the GUI, close the web browser, and log in again.

1.5.1 Overview

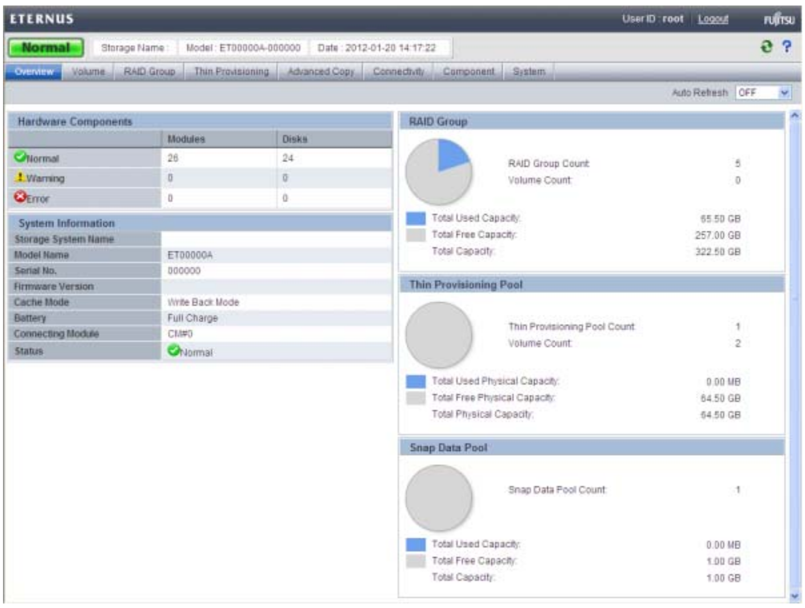
Overview screen appears immediately after logging in to the GUI. The status of the ETERNUS DX Disk storage system and the usage of RAID groups, Thin Provisioning Pools (TPP), and Snap Data Pools (SDP) can be checked in this screen.

Caution

- The [Start Initial Setup] screen is displayed for the first login after installation of the ETERNUS DX Disk storage system is complete.
- TPP usage is displayed only when the Thin Provisioning license is registered.
- SDP usage is displayed only when the Advanced Copy license is registered.

Note

Click the [ ] icon to update to the latest screen.



Auto Refresh

The [Overview] screen is refreshed at the specified update interval.

Select the update interval to refresh the [Overview] screen from "OFF", "60 sec.", "120 sec.", or "180 sec.".
The monitoring time is reset to "0" when the update interval is changed or the [ ] icon is clicked. If the specified interval is a value other than "OFF", the new update interval is applied after the monitoring time is reset.
The update interval works while the user is logged in to GUI even when other functions are started from the [Overview] screen. The update interval returns to the initial state ("OFF") when the Master CM is switched or when the user logs out of GUI.

Caution

Auto refresh is available only for the [Overview] screen. Screens other than [Overview] are refreshed when the [ ] icon is clicked or a screen is redisplayed.

System Message

A system message is displayed.

- Message
  When any information from the ETERNUS DX Disk storage system exists, an information message is displayed.

- Message
  When an event causes warning status, a warning message is displayed.
  If an LCD message is generated, the LCD message is displayed.
  If an Advanced Copy path in warning status exists, a message is displayed.

- Message
  When an event causes error status, an error message is displayed.
  If an LCD message is generated, the LCD message is displayed.
  If an Advanced Copy path in error status exists, a message is displayed.

Note

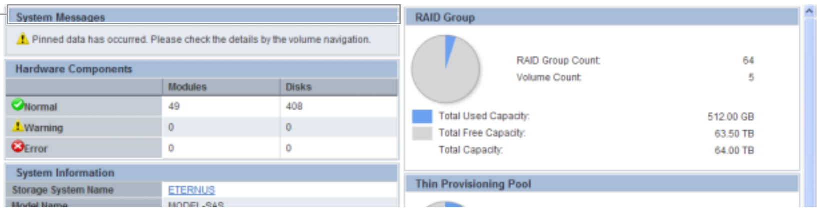
An "LCD message" is a message to notify if a failure or warning status occurs. It is displayed when the Master CM is used to operate the ETERNUS DX Disk storage system (when logged in to the ETERNUS DX Disk storage system by specifying the Master IP address (*1) via a web browser). The conditions for displaying LCD messages depend on the model of the ETERNUS DX Disk storage system.

*1: Refer to "11.2.3.1 Setup Network Environment" (page 745) for details.

- ETERNUS DX80 S2/DX 90 S2, ETERNUS DX410 S2/DX440 S2, or ETERNUS DX8100 S2:
  An LCD message is displayed if a component with failed status, a component with warning status, a storage system with failed status, or a storage system with warning status is detected. Note that specifying whether to display the LCD message is not available.

- ETERNUS DX8700 S2:
  An LCD message is displayed if a component with failed status, a component with warning status, a storage system with failed status, or a storage system with warning status is detected. The contents of a message that is to be displayed are the same as the contents of the LCD panel messages on the Operation panel. It is possible to specify whether to display LCD messages (equivalent to the LCD panel message on the Operation Panel) by using the [Setup Event Notification] function. Refer to "11.2.9.1 Setup Event Notification" (page 880) for details. Because it is possible to specify whether to display the LCD messages by using the [Setup Event Notification] function, the message displayed might not match the status display for the corresponding component.

System message



Hardware Components

The number of components for each status is displayed.

- Normal
  - Modules
    The number of components in normal status (*1) is displayed.
  - Disks
    The number of drives in normal status is displayed.
- Warning
  - Modules
    The number of components in warning status (*1) is displayed.
  - Disks
    The number of drives in warning status is displayed.
- Error
  - Modules
    The number of components in error status (*1) is displayed.
  - Disks
    The number of drives in error status is displayed.

*1: The number of components that can be maintained. The number of components does not include the number of drives.

System information

The information of the ETERNUS DX Disk storage system is displayed.

- Storage System Name
  The name for the ETERNUS DX Disk storage system is displayed.
  When logged in with a user account that can display detailed component information (*1), a link is displayed on the storage system name.
  Click this link to display the [Storage] screen in the [Component] navigation.

*1: A user account with the "Status Display" policy or the "Maintenance Operation" policy can display detailed component information. When logged in with a user account that has a "Monitor", "Admin", "StorageAdmin", "SecurityAdmin", or "Maintainer" default role, a link is displayed on the storage system name.

- Model Name
  The model name of the ETERNUS DX Disk storage system is displayed.

- Serial No.
  The serial number of the ETERNUS DX Disk storage system is displayed.

- Firmware Version
  The current controller firmware version is displayed.
  - VxxLyy-zzzz (Vxx: Version, Lyy: Level, zzzz: Release number)

- Cache Mode
  The current status and the factor of the cache are displayed. The normal status is "Write Back Mode".
  - Write Back Mode
    When a Write request is issued from the host, "Write Complete" is displayed after writing to the cache area is complete.
  - Write Through Mode
    When a Write request is issued from the host, "Write Complete" is displayed after writing to the cache area and the drives is complete.
    In the Write Through Mode, "Write Through (factors)" is displayed. When there are multiple factors, all the factors are displayed.
    The factors of the Write Through Mode are described below:
    - Write Through (Pinned Data)
      A large amount of pinned data (*2) is detected in the ETERNUS DX Disk storage system.
      *2: "Pinned data" is the data left in the cache memory due to unsuccessful write-back to the volume from the cache memory.
    - Write Through (Battery)
      The battery charge level is low.
    - Write Through (Maintenance)
      The following maintenance operation is currently being used:
      - Switch Controller Firmware
      - Change Controlling CM
      - Add Controller Module
    - Write Through (1CM)
      The ETERNUS DX Disk storage system is operated with 1CM. (*3)
      *3: This mode is displayed when "1CM Write Through" is enabled by using the procedure in "11.2.13.4 Setup Subsystem Parameters" (page 935) function and the ETERNUS DX Disk storage system is operated with 1CM (only 1CM can be used due to an error such as a CM failure). The "1CM Write Through" setting for the "Setup Subsystem Parameters" function is displayed and can be changed when logged in using a user account with the "Maintenance Operation" policy. The normal status is disabled.

- Battery
  The battery charge level is displayed.
  When the battery charge level is 90% or more, "Full Charge" is displayed. When the battery charge level is less than 90%, "xx%" is displayed. This item is displayed only when using the ETERNUS DX410 S2/DX440 S2 or the ETERNUS DX8100 S2/DX8700 S2.

- Connecting Module
  The Controller Module (CM) to which the GUI is connected is displayed.

- Status
  The status of the ETERNUS DX Disk storage system is displayed.
  - Normal
  - Maintenance
  - Warning
  - Error
  - Not Ready (*)
    *: This number indicates the cause of the Not Ready status.

RAID Groups

The usage of RAID groups is displayed.

- Pie chart
  The pie chart indicates the total used capacity and the total free capacity in the RAID groups.
  Blue: Total used capacity
  Gray: Total free capacity
- RAID Group Count
  The number of RAID groups registered in the ETERNUS DX Disk storage system is displayed.
  The "RAID Group Count" includes the number of RAID groups that configure TPPs and the number of RAID groups that are registered as REC Disk Buffers.
- Volume Count
  The number of volumes registered in the ETERNUS DX Disk storage system is displayed.
  The "Volume Count" displays the number of "Standard" type volumes and "Wide Striping Volumes (WSV)".
- Total Used Capacity
  The total used capacity of the RAID groups [TB/GB/MB] is displayed. The "Total Used Capacity" is the total capacity of all of the RAID groups that are used. An example of this capacity is space that is used for volumes in the RAID groups. This value does not include the capacity of RAID groups that configure TPPs and the capacity of RAID groups that are registered as REC Disk Buffers.
- Total Free Capacity
  The total free capacity of the RAID groups [TB/GB/MB] is displayed. The "Total Free Capacity" is a total of unused capacities in the RAID groups. This value does not include the capacity of RAID groups that configure TPPs and the capacity of RAID groups that are registered as REC Disk Buffers.
- Total Capacity
  The total capacity of the RAID groups [TB/GB/MB] is displayed. The "Total Capacity" is the total capacity of all the RAID groups in the ETERNUS DX Disk storage system. This value does not include the capacity of RAID groups that configure TPPs and the capacity of RAID groups that are registered as REC Disk Buffers.

  Total Free Capacity = Total Capacity - Total Used Capacity

Thin Provisioning Pool

The usage of TPP is displayed.

- Pie chart
  The pie chart indicates the total used physical capacity and the total free physical capacity in the TPPs.
  Blue: Total used physical capacity
  Gray: Total free physical capacity
- Thin Provisioning Pool Count
  The number of TPPs registered in the ETERNUS DX Disk storage system is displayed.
- Volume Count
  The number of volumes registered in the ETERNUS DX Disk storage system is displayed.
  This value displays the number of "TPV" type volumes.
- Total Used Physical Capacity
  The total used physical capacity of the TPPs [TB/GB/MB] is displayed. The "Total Used Physical Capacity" is the total physical capacity of all the TPPs that are used for volumes.
- Total Free Physical Capacity
  The total free physical capacity of the TPPs [TB/GB/MB] is displayed. The "Total Free Physical Capacity" is the total unused physical capacity of all the TPPs.
- Total Physical Capacity
  The total physical capacity of the TPPs [TB/GB/MB] is displayed. The "Total Physical Capacity" is the total physical capacity of all the TPPs in the ETERNUS DX Disk storage system.

Total Free Physical Capacity = Total Physical Capacity - Total Used Physical Capacity

Snap Data Pool

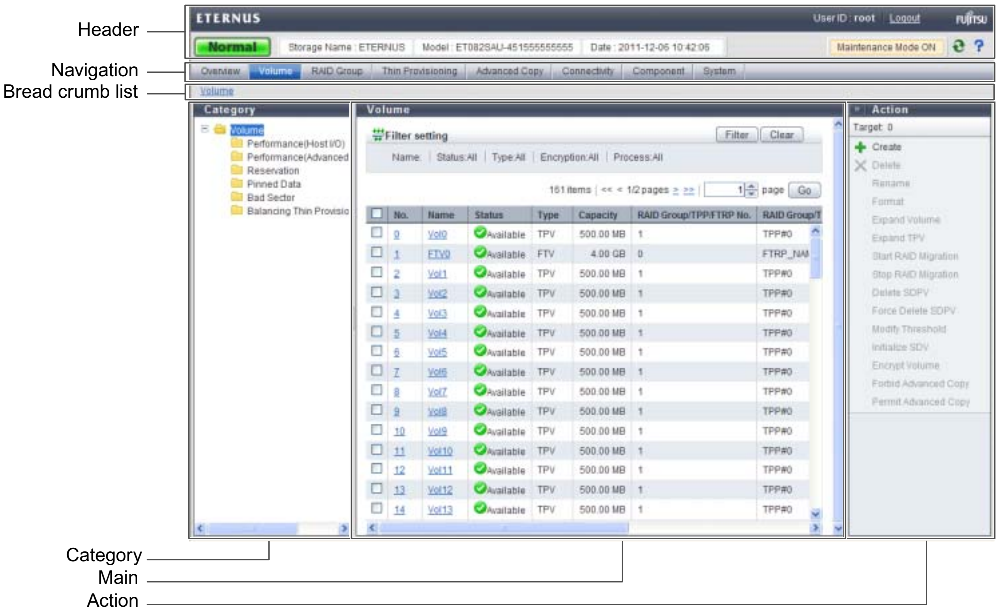
The usage of SDP is displayed.

- Pie chart
  The pie chart indicates the total used capacity and the total free capacity in the SDP.
  Blue: Total used capacity
  Gray: Total free capacity
- Snap Data Pool Count
  The number of SDPs that are registered in the ETERNUS DX Disk storage system is displayed.
- Total Used Capacity
  The total used capacity of the SDP [TB/GB/MB] is displayed. The "Total Used Capacity" is the total capacity of all the SDPs that are used for volumes.
- Total Free Capacity
  The total free capacity of the SDP [TB/GB/MB] is displayed. The "Total Free Capacity" is the total unused capacity of all the SDPs.
- Total Capacity
  The total capacity of the SDP [TB/GB/MB] is displayed. The "Total Capacity" is the total capacity of all the SDPs in the ETERNUS DX Disk storage system.

Total Free Capacity = Total Capacity - Total Used Capacity

1.5.2 Screen Structures

This section describes screen layouts for functions other than Overview screen.



Header

User ID, [Logout] link, general status, storage system name, model name, date, [ ] icon (Refresh), and [ ] icon (Help) are displayed in the header. When maintenance is being performed for the ETERNUS DX Disk storage system, the "Maintenance Mode ON" is displayed. If a user with the "Maintenance Operation" policy logs into GUI, "Maintenance Mode OFF" is displayed when no maintenance operation is being performed.
The header is always displayed.

- General status of the ETERNUS DX Disk storage system
  Status of each component in the ETERNUS DX Disk storage system is monitored periodically, and the result is displayed as a general status icon with character strings. Refer to "B.1 Device General Status" (page 972) for details about the general status.

Navigation

Overview, Volume, RAID Group, Thin Provisioning, Advanced Copy, Connectivity, Component, and System tabs are displayed.
Click the tab for the function that is to be used to display a list screen for that function.
The navigation is always displayed.

Bread crumb list

Bread crumb indicates the location of the current screen on the GUI.
Click the link to display the list screen of the target item.

Category

The subordinate items are displayed for an item that is clicked in the navigation. The category directory is used for switching the contents that are displayed in the Main screen. Click the item for the function that is to be used. The horizontal width of the category area can be changed.

Main

A list of items is displayed for an item that is clicked on the navigation or in the category.
The filter setting area may also be displayed for some lists.

- Filter setting
  Filter setting is a function used to display a list of only the items meeting all the specified conditions. The conditions that are available depend on the function. No filtering is set by default.

Action

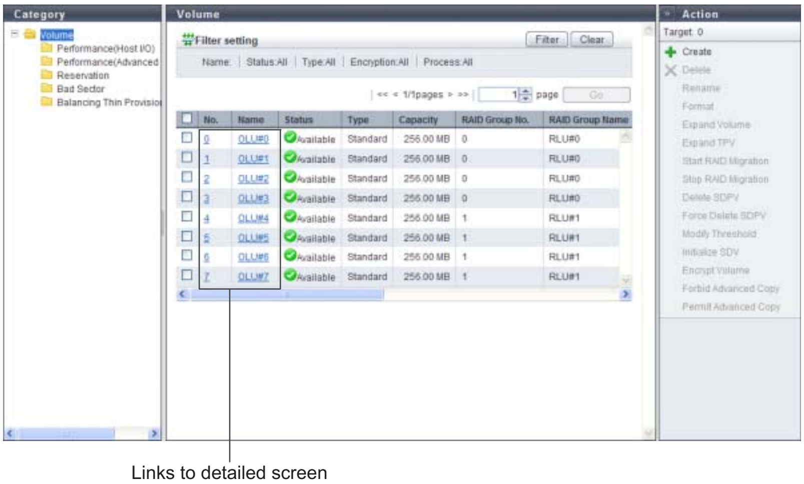
Only the available functions for the selected items from the navigation or in the category are displayed. Click the function that is to be used to display the wizard screen.
Click the [>>] button to switch the display of the action area.
The number of operation targets that is selected in the Main area is displayed in the "Target:" field. When no selections are made, "0" is displayed.

1.5.3 List Screen/Detailed Screen

There are two types of main screens; a list screen and a detailed screen.
The header, bread crumb list, and navigation areas are not included in the screen shots in this section.

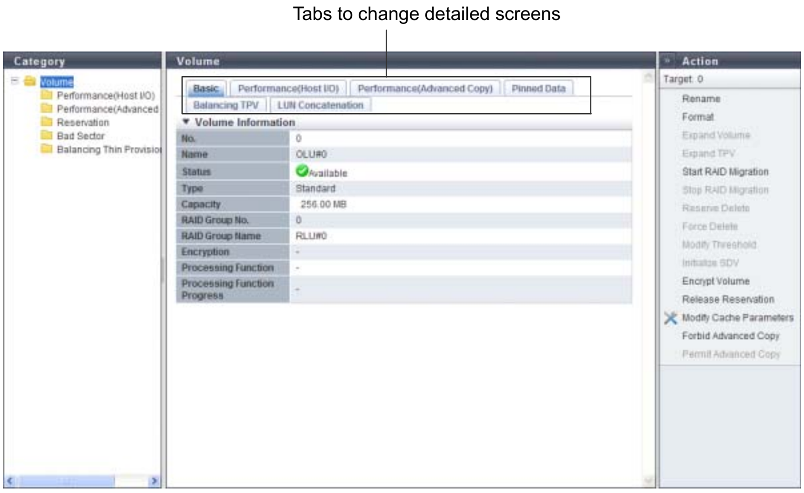
List screen

A list of the items that were clicked on the navigation or in the category is displayed. For items with detailed information, links to the detailed screens are displayed.



Detailed screen

Click the link for each item in the list screen to display a detailed screen. Click the tabs that are displayed to switch the display.

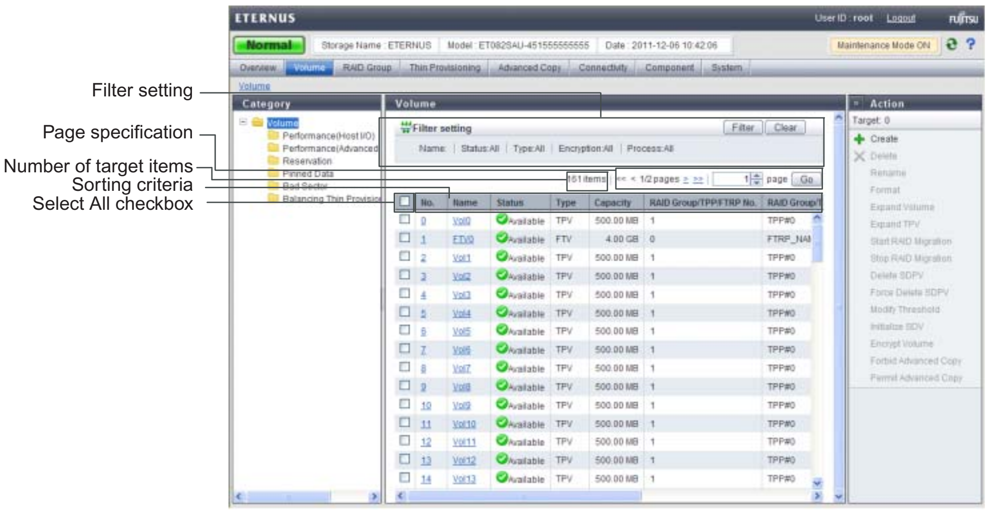


Note

For some items, the same information may be displayed for the list screen and the detailed screen. From Chapter 5 onward, only the information for items in the detailed screen that is different from the list screen is described.

1.5.4 Basic Operation

Select the desired item and execute the selected operation.



Selecting an operation

When an item in the navigation or category is clicked, a list items for the selected item is displayed. Select the checkbox or checkboxes of the listed items for the desired operation. Note that some operations, such as creating new volumes, do not require the item to be selected.
The following operations are available in the list screen:

- Filter setting
  Filter setting is a function used to display a list of only the items that meet all the specified conditions. The settings that can be specified vary depending on the function that is selected. No filtering is set by default.
- Number of target items
  The number of operation target items that are registered in the ETERNUS DX Disk storage system is displayed.
- Page specification
  Page specification is a function used to display the specified page. This setting is available when lists are displayed on multiple pages. The total number of pages and the current page number is displayed.
  - Click the [<<] button to display the first page.
  - Click the [<] button to display the previous page.
  - Click the [>] button to display the next page.
  - Click the [>>] button to display the last page.

  When specifying the page that is to be displayed, input the numeric character in the page specification spin box and click the [Go] button. A list for the specified page is displayed.
- Sort
  Sorting is a function that rearranges the order of the display items in ascending order (A - Z or 0 - 9), in descending order (Z - A or 9 - 0), or in a specific order. Click the sorting criteria to change the order. The item that is furthest to the left is displayed in ascending order by default.
- Select All checkbox
  The "Select All" checkbox is the first item in the left of the item field. Click this checkbox to select all of the checkboxes that are listed. This checkbox is left clear by default.

Executing an operation

Select the desired operation item from the navigation or category, and then select the function that is to be executed in the Action field.
Only the available functions for the displayed item are displayed in the Action field.
Some functions in the Action field require one target item from the list to be selected, some functions require multiple target items to be selected, and other functions can be performed without selecting any items.

- [Cancel] button
  Deletes the newly added or changed information, and then returns to the previous screen. Or cancels the current operation, and then returns to the previous screen.

Note

The header, bread crumb list, and navigation areas are not included in the screen shots in the following chapters and sections.

Updating the screen display

When the [ ] icon in the global header is clicked or a category, a navigation, or an action is selected, the most recently updated screen is obtained. If a tab is clicked, the screen is not updated. Note that only the [Overview] screen automatically updates periodically according to the specified update interval.

Chapter 2
Startup and Shutdown

This chapter describes how to start, exit, log in, and log out from GUI.

2.1 Startup of GUI

Startup the login screen for GUI.
Connect the PC and the ETERNUS DX Disk storage system using a LAN cable, and display the login screen via the web browser.
The procedure to start up the login screen for GUI is as follows:

Procedure

1. Directly connect the PC and MNT port of the ETERNUS DX Disk storage system via LAN cable.
2. Set the IP address and subnet mask for the PC to match the ETERNUS DX Disk storage system network settings.
3. Enter "http://IP address of the storage system/" to the address bar in the web browser (Default IP address is "192.168.1.1").
   → The login screen for GUI is displayed. Refer to "2.2 Login" (page 34) for detailed procedure to login.

Caution

- When using SSL (https), the "SSL server certificate" or the "self-signed SSL certificate" must be registered in the ETERNUS DX Disk storage system in advance.
  - When registering "SSL server certificate"
    a Send the CSR that is downloaded using the procedure in "11.2.3.16 Create Key/CSR" (page 790) to the certification authority and obtain the "SSL server certificate".
    b Register the obtained "SSL server certificate" by using the procedure in "11.2.3.17 Register SSL Certificate" (page 795).
  - When registering "self-signed SSL certificate"
    a Create the "self-signed SSL certificate" using the procedure in "11.2.3.15 Create Self-signed SSL Certificate" (page 787).
    b Register the created "self-signed SSL certificate" in the ETERNUS DX Disk storage system as described in "Appendix C Installing the Security Certificate" (page 981).
- If Firefox 3.6.x is used for connecting to the ETERNUS DX Disk storage system via "https", a communication error may occur. This error can be avoided by connecting via "http" or by using "Internet Explorer".

Note

- Refer to "11.2.3.1 Setup Network Environment" (page 745) for procedure to set the IP address of the MNT port.
- The default number of port that is used for http connection is "80".

End of procedure

2.2 Login

Log in to GUI to start the operation. The GUI operation screen appears.
The menu that is displayed depends on the role that is applied for the user account.

Caution

If a login is attempted while 16 users are already logged in to the GUI, an error screen appears. When this occurs, note the error message and try logging in again after completing the required operation.

The procedure for logging in is as follows:

Procedure

1 Click the [Option] button in the login screen, and select the language (English or Japanese).

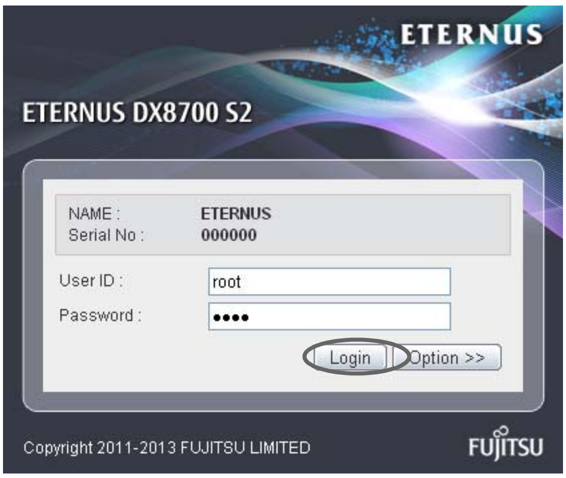
2 Enter the User ID and Password, and click the [Login] button.

The User ID and the Password vary depending on which account is being used to log in.

- User ID
  root
- Password
  root (Default)

Note

- Refer to "11.2.7 Define Role" (page 853) for user accounts.
- If the input error occurs, enter the User ID and Password again to log in to the ETERNUS DX Disk storage system.



→ The operation screen appears.

Caution

Up to 16 users can be logged in concurrently from the GUI (the number of users that are logged from CLI is not included). Logging in 17 or more users is not allowed.
Also note that when another user is already logged in and performing one of the following operations, a warning message appears and some functions cannot be used. Confirm the current GUI usage state and start operation.

- When applying controller firmware
- When applying disk firmware
- During the RAID group diagnosis
- During the disk diagnosis

End of procedure

2.3 Logout

Log out from GUI to finish the operation.

Caution

A logout is performed automatically under the following conditions:

- When a different user executes a forcible logout (*1)
- When the ETERNUS DX Disk storage system is turned off
- When no operation is performed for 60 minutes or longer after logging in

*1: When the user name is the same as a user who is already logged in, the user who was previously logged in is forcibly logged out.

The procedure for logging out is as follows:

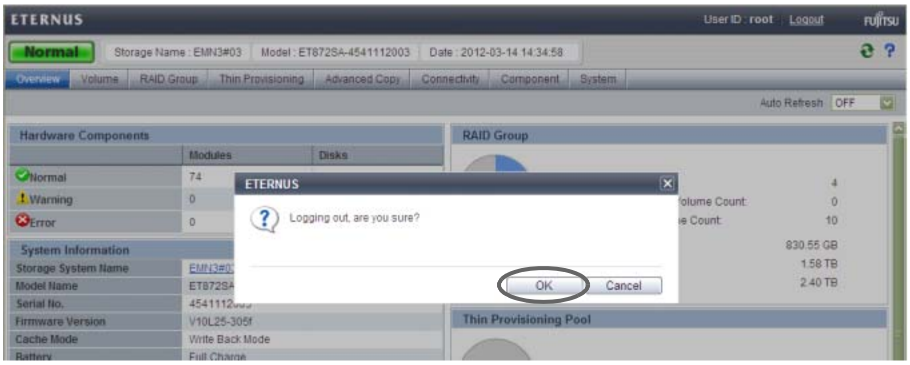
Procedure

1 Click the [Logout] link on the top right of the screen.



→ A confirmation screen appears.

2 Click the [OK] button.



→ This completes the logging out process.
The login screen appears.

End of procedure

2.4 Exit

Exit from GUI.

Caution

Make sure to perform "2.3 Logout" (page 36) operation before exiting GUI.
If exiting GUI without logging out, the login status is not released.

The procedure to exit is as follows:

Procedure

1 Click the [Close] button for the web browser.

→ Exit from GUI.
The login screen does not appear.

End of procedure

Chapter 3
Initial Setup

This chapter describes the Initial Setup function for the ETERNUS DX Disk storage system.

This function performs the required initial settings that must be set before operating the ETERNUS DX Disk storage system on a series of wizard screens.
Initial Setup is divided into "Initial Setup 1" and "Initial Setup 2".

- Initial Setup 1
  Performs the minimum settings required before using the ETERNUS DX Disk storage system.
- Initial Setup 2
  Makes the reporting settings for when an error occurs in the ETERNUS DX Disk storage system. The settings can be omitted if the reporting function will not be used.

Caution

If the browser is shut down during execution of Initial Setup, other functions will no longer be available. If this case, forcibly log in using the same user name, and perform Initial Setup 1 again from the beginning. However, if you have already reached Initial Setup 2, the wizard is executed from the beginning of Initial Setup 2.

Note

The settings made in the Initial Setup can be changed individually later.

3.1 Initial Setup 1

The flow of wizard operations in Initial Setup 1 is shown below.

(1) Set Storage Name
Register the name, administrator, and installation site of the ETERNUS DX Disk storage system. Refer to "11.2.13.1 Modify Storage System Name" (page 927) for details.

(2) Set Date and Time
Set the date/time and time zone (storage system location) of the internal clock in the ETERNUS DX Disk storage system. Refer to "11.2.13.2 Modify Date and Time" (page 929) for details.

(3) Change Password
Change the password for the default account that is currently logged in before starting to use the ETERNUS DX Disk storage system. Refer to "11.2.1 Change User Password" (page 742) for details.

(4) Register Thin Provisioning License
If using the Thin Provisioning function, register the license here. Refer to "7.2.10 Register Thin Provisioning License" (page 245) for details.

(5) Register Copy License
If using the Advanced Copy function, register the license here. Refer to "8.2.4 Register Advanced Copy License" (page 295) for details.

(6) Register SED Authentication Key
Register the Self Encrypting Drive (SED) authentication key to enable the encryption function of the SED. Refer to "11.2.13.7 Register SED Authentication Key" (page 944) for details

(7) Set Network Environment
Set the environment for the ETERNUS DX Disk storage system to communicate on the network such as IP address and subnet mask. Refer to "11.2.3.1 Setup Network Environment" (page 745) for details.

Log out when the settings are complete. Log in again, and then proceed to "3.2 Initial Setup 2" (page 49).
If SED has been installed before registering the SED authentication key, reboot the ETERNUS DX Disk storage system before logging in again.

The procedure to perform Initial Setup 1 is as follows:

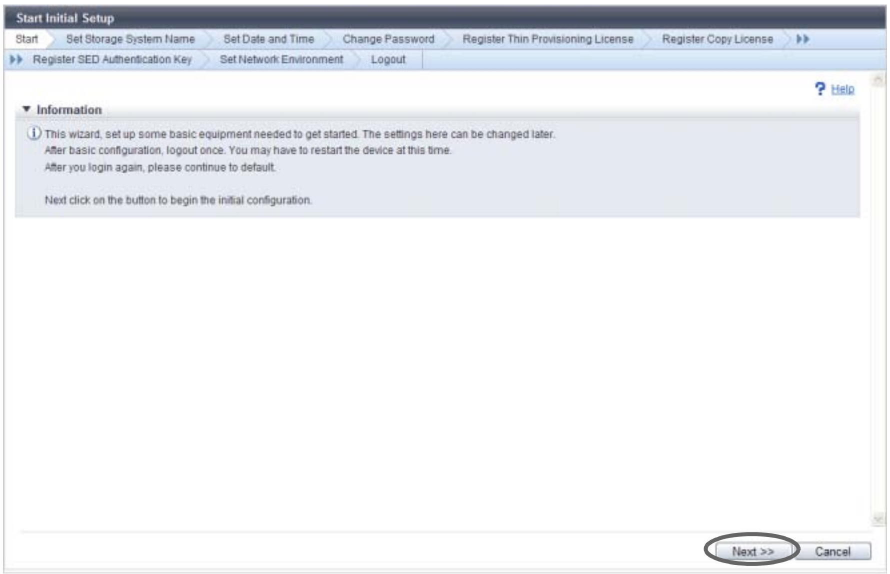
Procedure

1 Click [Start Initial Setup] in [Action].

Note

The [Start Initial Setup] screen is displayed after logging in for the first time.

2 Click the [Next >>] button.

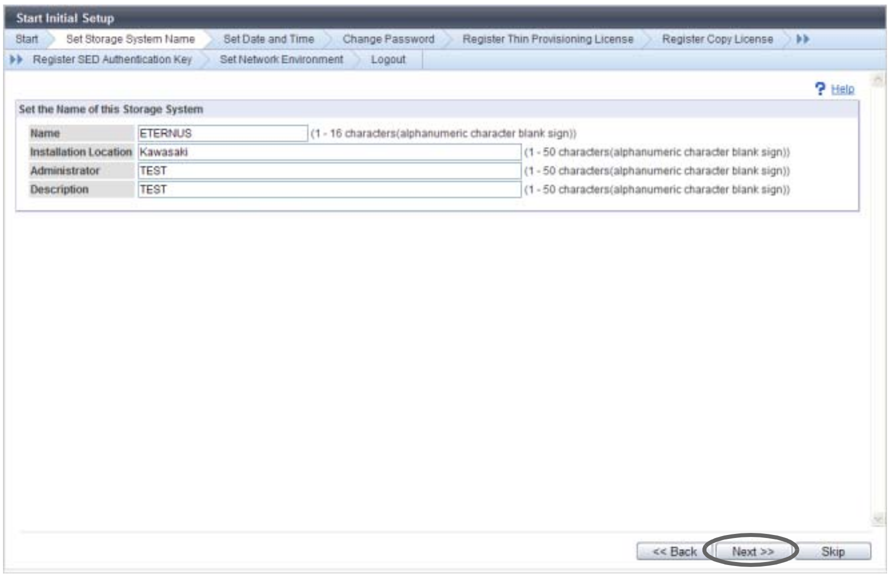


→ Initial Setup starts.

3 Proceed to [Set Storage System Name].

3-1 Specify the following items, and click the [Next >>] button.

- Name
- Installation Location
- Administrator
- Description



→ A confirmation screen appears.

Note

- If logging in for the first time, be sure to set the name of the ETERNUS DX Disk storage system.
- If not logging in for the first time, click the [Skip] button to proceed to the next screen without setting.

3-2 Click the [OK] button.

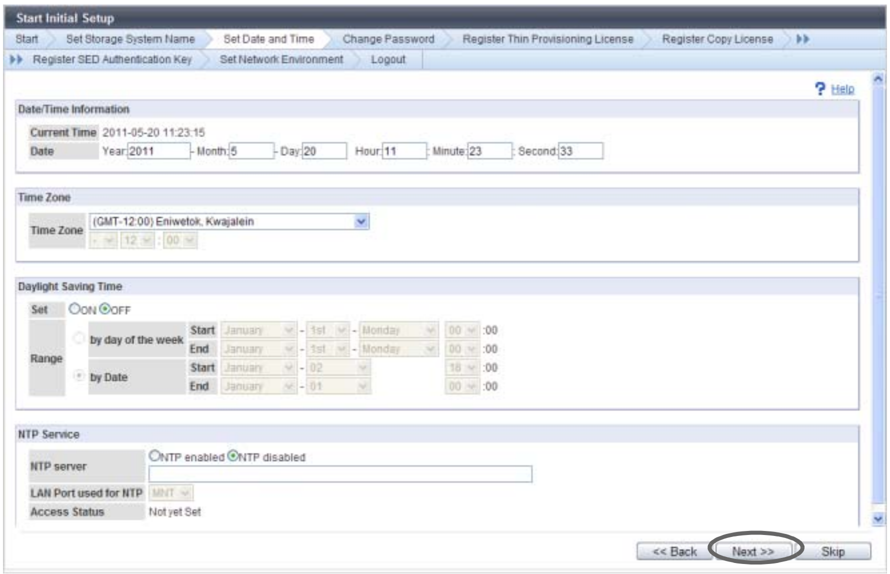
→ Setting of the storage system name starts.

3-3 Click the [Done] button.

4 Proceed to [Set Date and Time].

4-1 Specify the following items, and click the [Next >>] button.

- Date/Time Information
- Time Zone
- Daylight Saving Time
- NTP Service



→ A confirmation screen appears.

> **Note**
>
> Click the [Skip] button to proceed to the next screen without setting.

4-2 Click the [OK] button.

→ Setting of the Date/time starts.

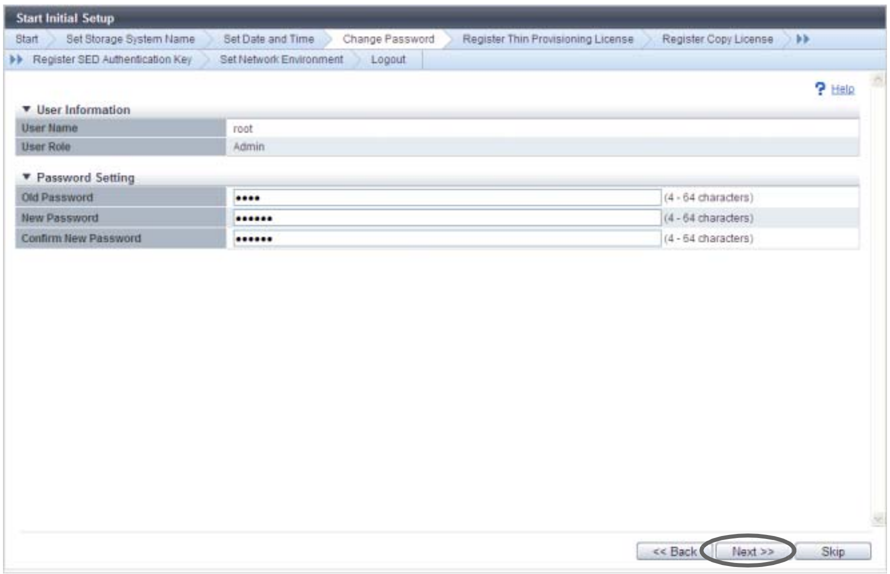
> **Caution**
>
> If "NTP enabled" is selected for "NTP server" when there is no NTP server connection or when communication with the NTP server is unstable, the required time for the date and time setting may take longer. Wait until the screen is updated. Even if connection to the NTP server fails, the date and time setting appear as though they have completed. To confirm that the ETERNUS DX Disk storage system is successfully connected to the NTP server, use the procedure in "11.2.13.2 Modify Date and Time" (page 929) and check "Access Status" in the "NTP Service" field.

4-3 Click the [Done] button.

5 Proceed to [Change Password].

5-1 Specify the following items, and click the [Next >>] button.

- Old Password
- New Password
- Confirm New Password



Note

Click the [Skip] button to proceed to the next screen without setting.

→ A confirmation screen appears.

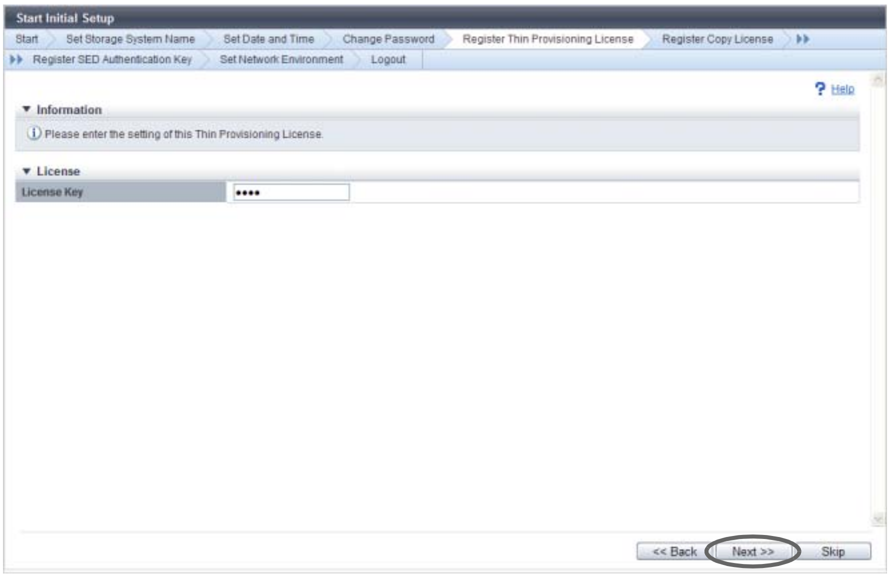
5-2 Click the [OK] button.
→ Changing of the password starts.

5-3 Click the [Done] button.

6 Proceed to [Register Thin Provisioning License].

6-1 Specify the following items, and click the [Next >>] button.

- License Key (if not already registered)



→ A confirmation screen appears.

Note

- If the Thin Provisioning license key is already registered, proceed to [Register Copy License].
- Click the [Skip] button to proceed to the next screen without setting.

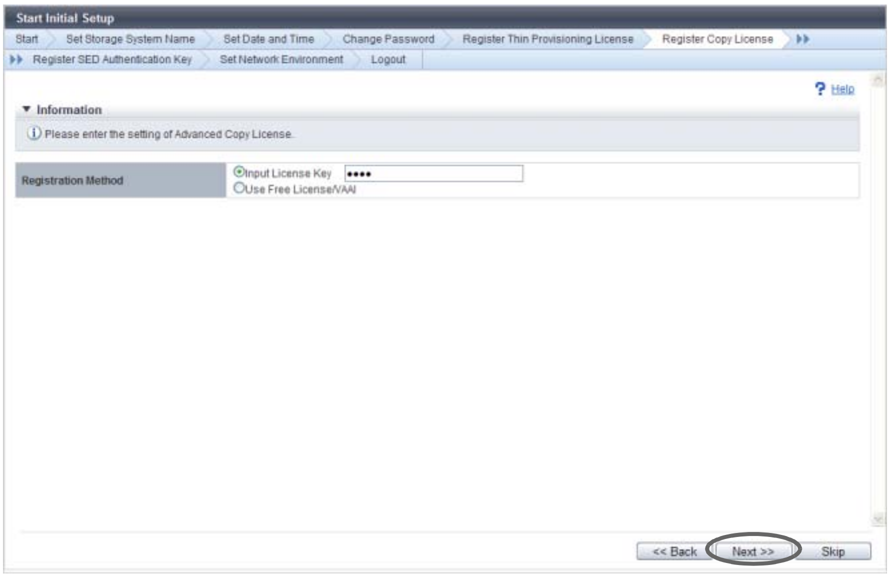
6-2 Click the [OK] button.
→ Thin Provisioning license is registered.

6-3 Click the [Done] button.

7 Proceed to [Register Copy License].

7-1 Specify the following items, and click the [Next >>] button.

- Registration Method
- License Key



→ A confirmation screen appears.

Note

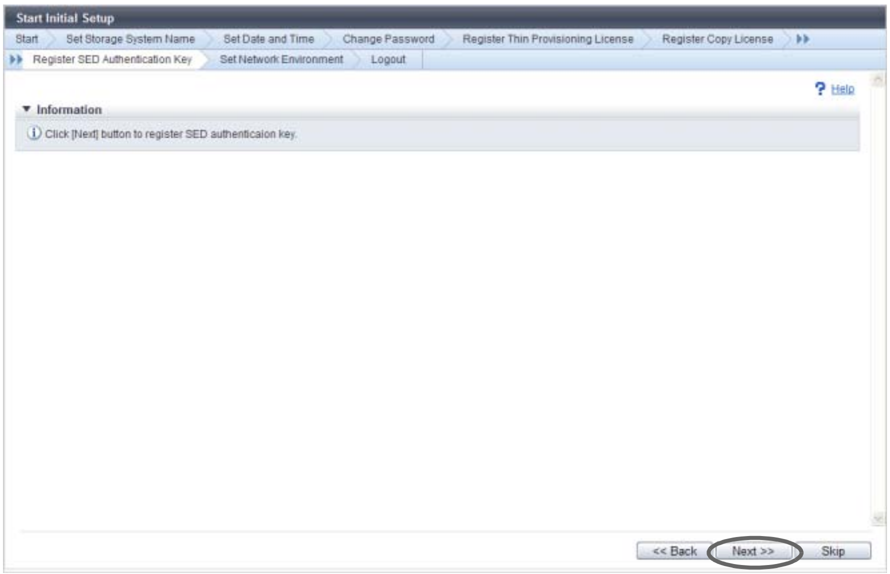
- When using ETERNUS SF AdvancedCopy Manager or ETERNUS SF Express, perform the required settings described in the documents that are supplied with ETERNUS SF AdvancedCopy Manager or ETERNUS SF Express.
- If a Advanced Copy license (trial license) is already registered, the paid license can be registered. Input the license key.
- If the Advanced Copy license key (paid license) is already registered, proceed to [Register SED Authentication Key].
- Click the [Skip] button to proceed to the next screen without setting.

7-2 Click the [OK] button.
→ The Advanced Copy license registration is executed.

7-3 Click the [Done] button.

8 Proceed to [Register SED Authentication Key].

8-1 Click the [Next >>] button.



→ A confirmation screen appears.

Note

- If the SED Authentication Key is already registered, proceed to [Set Network Environment].
- Click the [Skip] button to proceed to the next screen without setting.

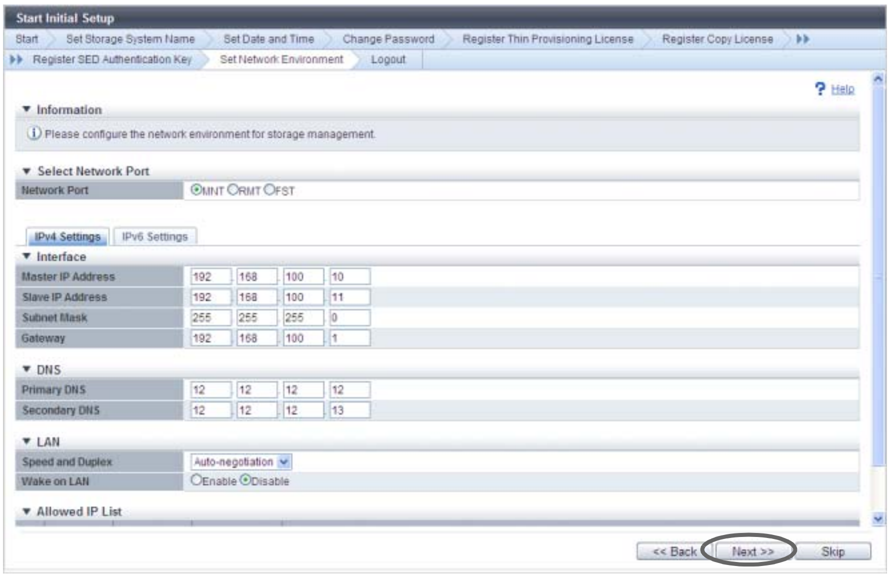
8-2 Click the [OK] button.
→ SED Authentication Key registration starts.

8-3 Click the [Done] button.

9 Proceed to [Set Network Environment].

9-1 Specify the following items, and click the [Next >>] button.

- Select Network Port
- Interface
- DNS
- LAN (only for IPv4)
- Allowed IP List



→ A confirmation screen appears.

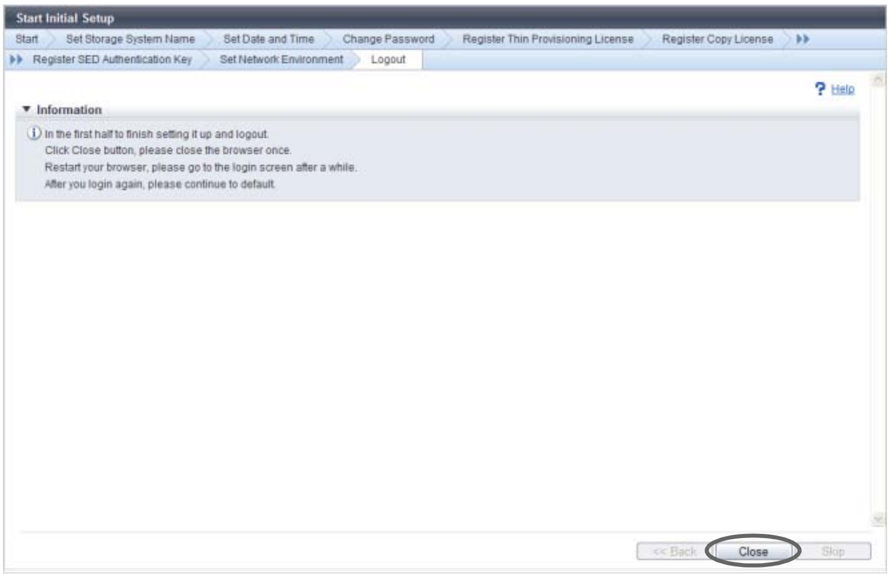
Note

Click the [Skip] button to proceed to the next screen without setting.

9-2 Click the [OK] button.
→ Setting of the network environment starts.

9-3 Click the [Finish] button.
→ A completed screen appears.

10 Click the [Close] button.



→ The browser is closed, and Initial Setup 1 is complete.

Note

- Follow the on-screen instructions to reboot the ETERNUS DX Disk storage system if needed.
- Restart the browser, and wait a few minutes before logging into the GUI again. After logging in again, continue with the initial setup. Proceed to Initial Setup 2.

End of procedure

3.2 Initial Setup 2

This sets the various reports that are generated when an error occurs in the ETERNUS DX Disk storage system. If monitoring the ETERNUS DX Disk storage system, use this wizard to build an environment.

The flow of wizard operations in Initial Setup 2 is shown below.

Note

Some functions do not need to be specified depending on the SNMP version.

(1) Set SNMP Agent Basic

Set up the SNMP Agent basic interface in the ETERNUS DX Disk storage system. Refer to "11.2.3.3 Setup SNMP Agent Basic Interface" (page 761) for details.

(2) Set SNMP Manager

Specify the IP address of the SNMP Manager. Refer to "11.2.3.4 Setup SNMP Manager" (page 763) for details.

(3) Set SNMP Agent MIB Access View

Set the MIB View of the SNMP Agent. Refer to "11.2.3.5 Setup SNMP Agent MIB Access View" (page 766) for details.

(4) Set SNMP Agent User

Set up the SNMP Agent User.
Set the security levels and the MIB access view for each user. Refer to "11.2.3.6 Setup SNMP Agent User" (page 768) for details.

Note

This setting is not required when SNMPv1 or SNMPv2c is used for SNMP communication.

(5) Set SNMP Agent Community

Set up the SNMP Agent Community. Refer to "11.2.3.7 Setup SNMP Agent Community" (page 771) for details.

Note

This setting is not required when SNMPv3 is used for SNMP communication.

(6) Set SNMP Agent Trap

Set up the environment to send notification of events that occur in the ETERNUS DX Disk storage system to the SNMP Manager by an SNMP Trap. Refer to "11.2.3.8 Setup SNMP Agent Trap" (page 774) for details.

(7) Set E-Mail Notification

Set the E-mail notification for events that occur in the ETERNUS DX Disk storage system. Refer to "11.2.3.12 Setup E-Mail Notification" (page 781) for details.

(8) Set Syslog Notification

Set up external servers (Syslog server) for sending logs of events that are detected by the ETERNUS DX Disk storage system. Refer to "11.2.3.13 Setup Syslog" (page 783) for details.

The procedure to perform Initial Setup 2 is as follows:

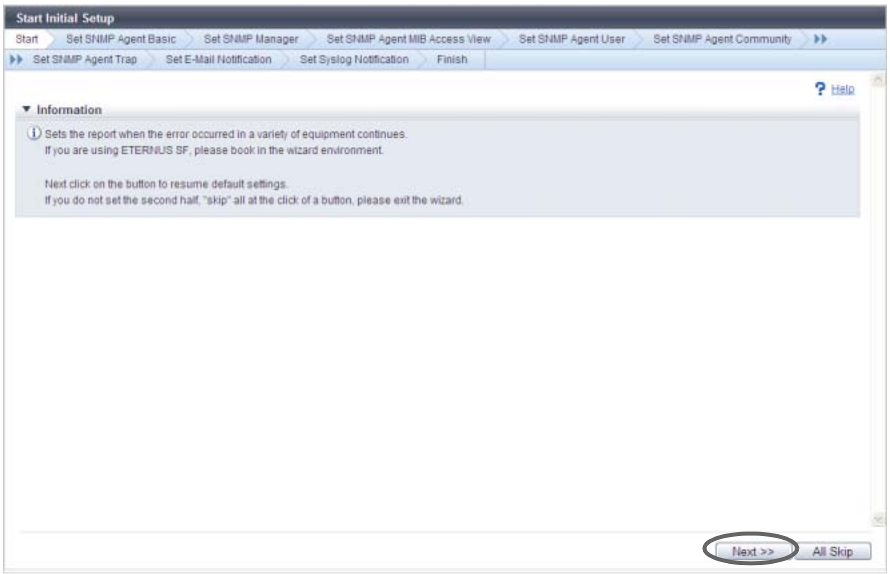
Procedure

1 Click [Start Initial Setup] in [Action].

Note

- When logging in again after Initial Setup 1 is complete, the [Initial Setup 2] screen appears.
- If all of the settings of Initial Setup 2 are not performed, click the [All Skip] button to exit the Initial Setup wizard.

2 Click the [Next >>] button.

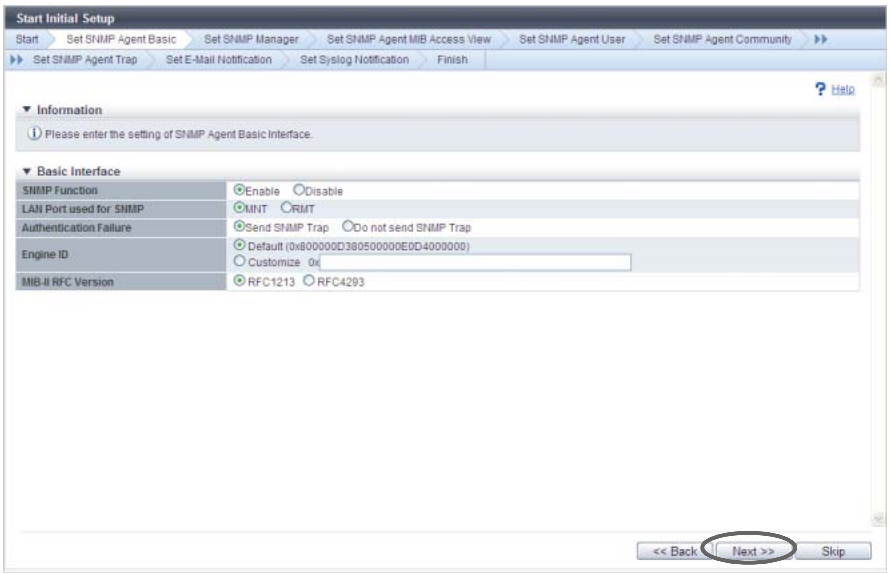


→ Initial Setup restarts.

3 Proceed to [Set SNMP Agent Basic].

3-1 Specify the following items, and click the [Next >>] button.

- SNMP Function
- LAN Port used for SNMP
- Authentication Failure
- Engine ID
- MIB-II RFC Version



Note

Click the [Skip] button to proceed to the next screen without setting.

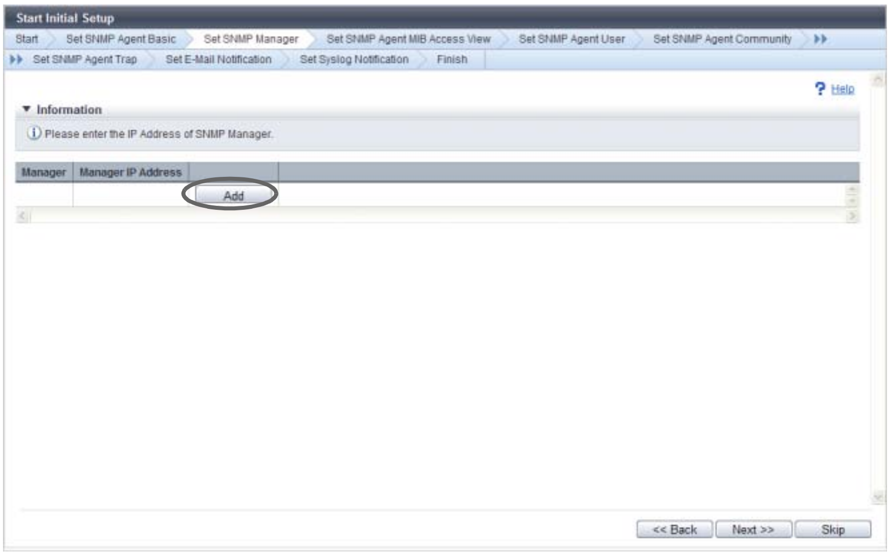
→ A confirmation screen appears.

3-2 Click the [OK] button.
→ Setting of the SNMP Agent basic starts.

3-3 Click the [Done] button.

4 Proceed to [Set SNMP Manager].

4-1 Click the [Add] button.

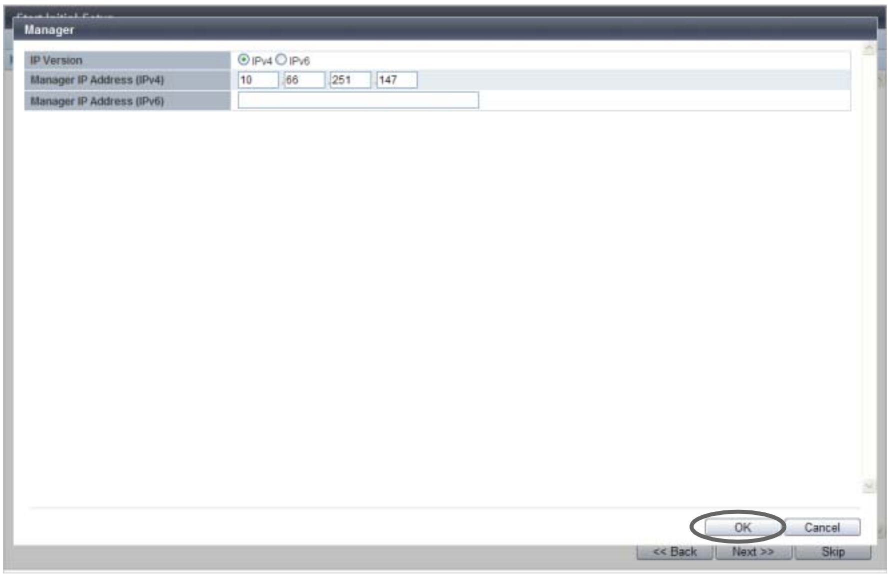


Note

Click the [Skip] button to proceed to the next screen without setting.

4-2 Specify the following items, and click the [OK] button.

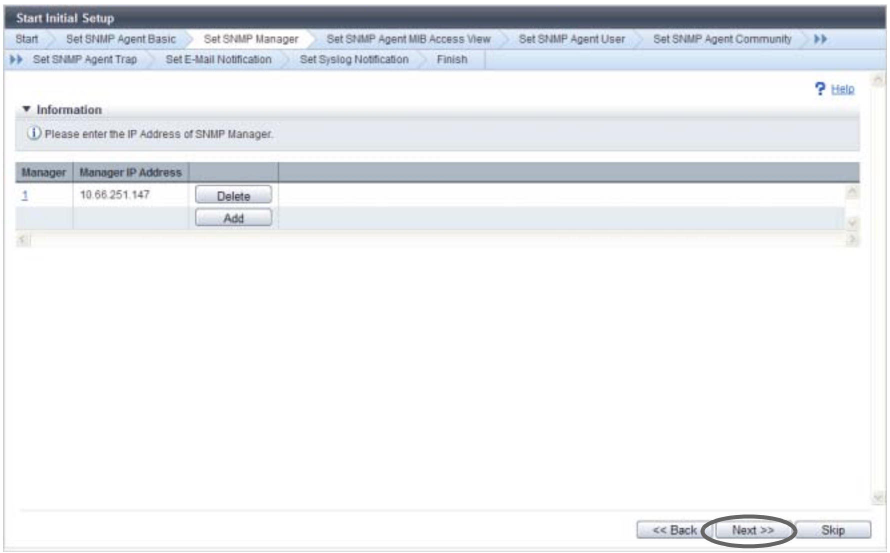
- IP Version
- Manager IP Address (IPv4)
- Manager IP Address (IPv6)



→ Returns to the original screen.

4-3 Repeat Step 4-1 and Step 4-2 to configure multiple IP addresses.

4-4 When the IP addresses are set, click the [Next >>] button.



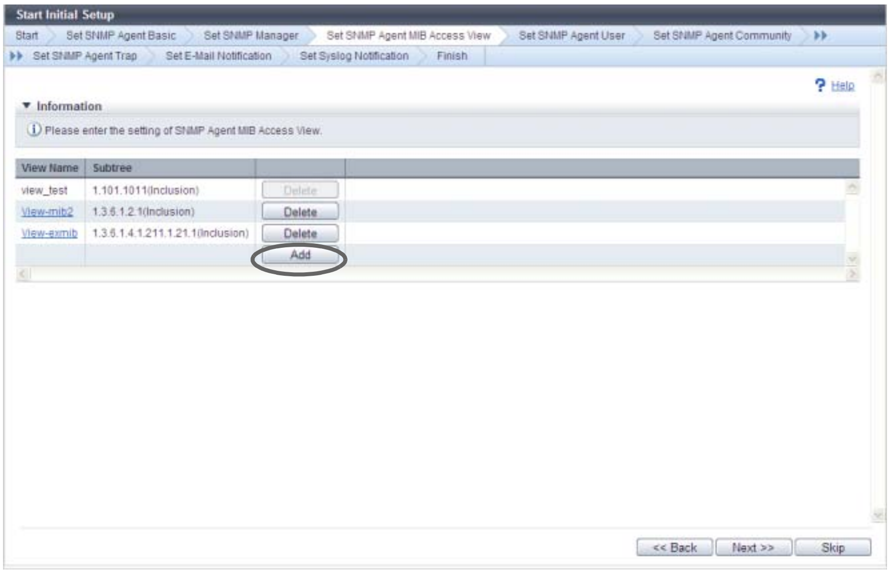
→ A confirmation screen appears.

4-5 Click the [OK] button.
→ Setting of the SNMP Manager starts.

4-6 Click the [Done] button.

5 Proceed to [Set SNMP Agent MIB Access View].

5-1 Click the [Add] button.

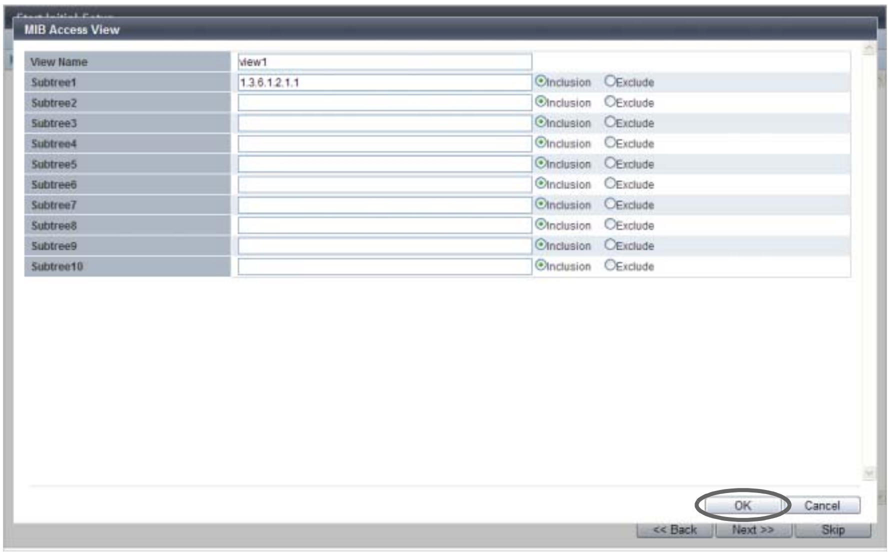


Note

Click the [Skip] button to proceed to the next screen without setting.

5-2 Specify the following items, and click the [OK] button.

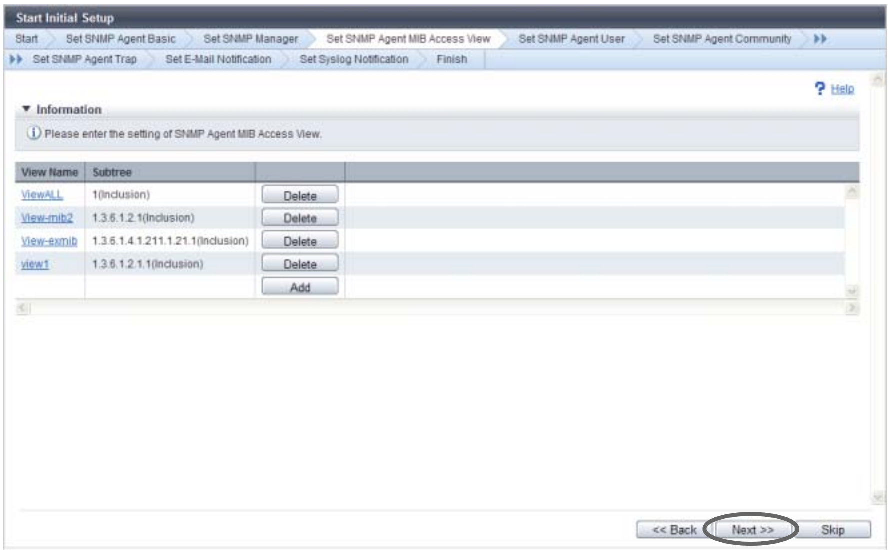
- View Name
- Subtree



→ Returns to the original screen.

5-3 Repeat Step 5-1 and Step 5-2 to configure multiple MIB Access Views.

5-4 When the setting of the MIB Access Views is complete, click the [Next >>] button.



→ A confirmation screen appears.

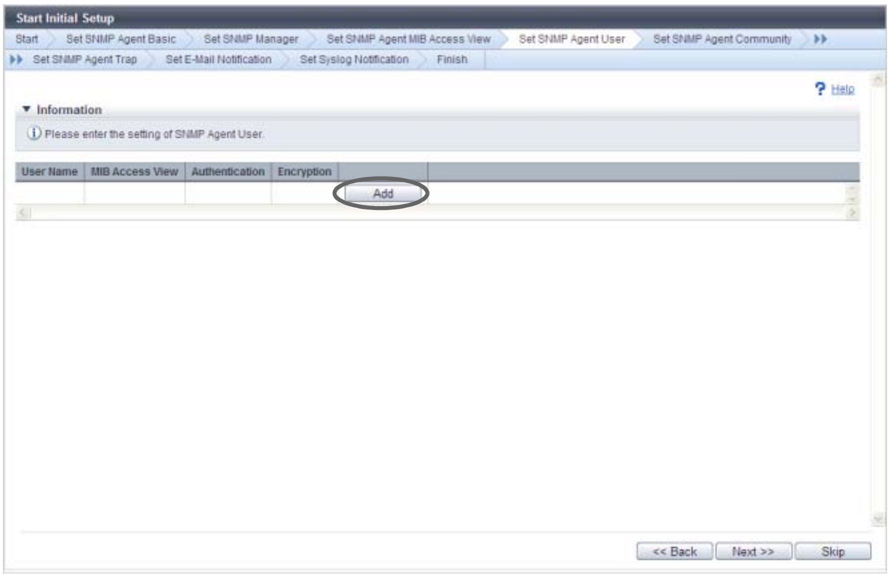
5-5 Click the [OK] button.

→ Setting of the SNMP Agent MIB Access View starts.

5-6 Click the [Done] button.

6 Proceed to [Set SNMP Agent User].

6-1 Click the [Add] button.



Caution

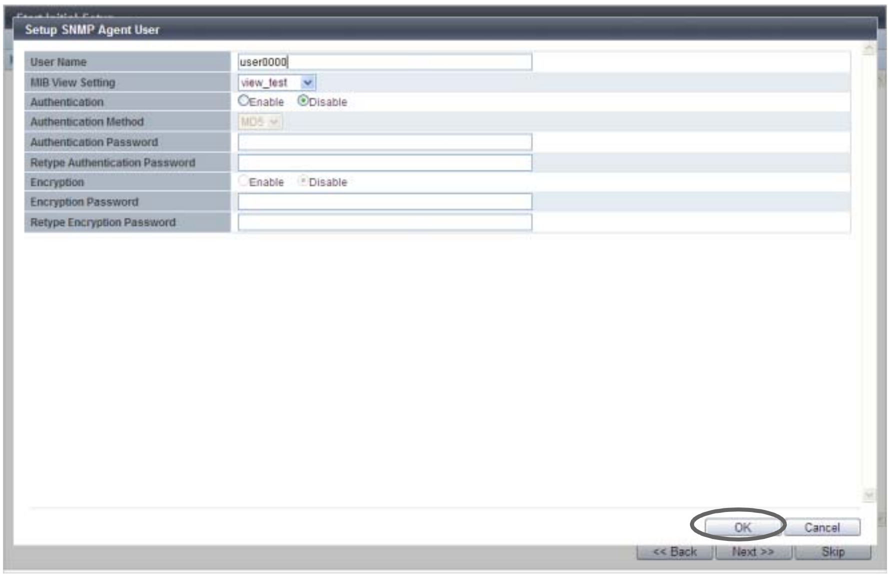
The [Set SNMP Agent User] function must be set when using SNMPv3 in SNMP communication between the SNMP Agent and SNMP Manager.

Note

Click the [Skip] button to proceed to the next screen without setting.

6-2 Specify the following items, and click the [OK] button.

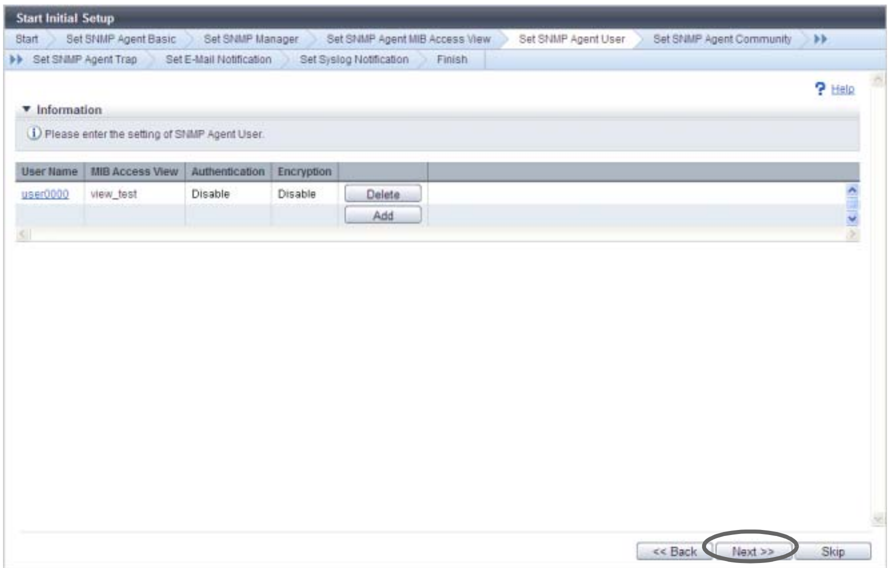
- User Name
- MIB View Setting
- Authentication
- Authentication Method
- Authentication Password
- Retype Authentication Password
- Encryption
- Encryption Password
- Retype Encryption Password



→ Returns to the original screen.

6-3 Repeat Step 6-1 and Step 6-2 to configure information for multiple users.

6-4 When the setting of the user information is complete, click the [Next >>] button.



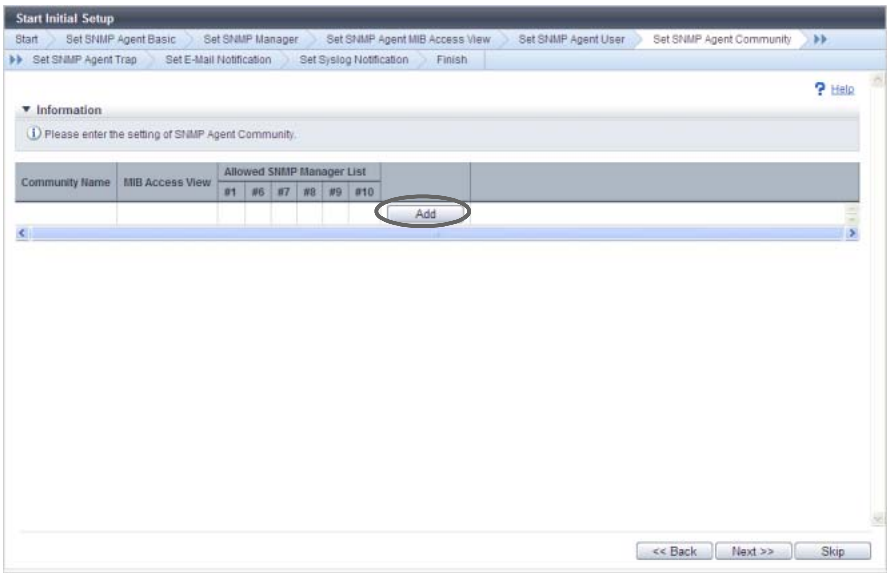
→ A confirmation screen appears.

6-5 Click the [OK] button.
→ Setting of the SNMP Agent User starts.

6-6 Click the [Done] button.

7 Proceed to [Set SNMP Agent Community].

7-1 Click the [Add] button.



Caution

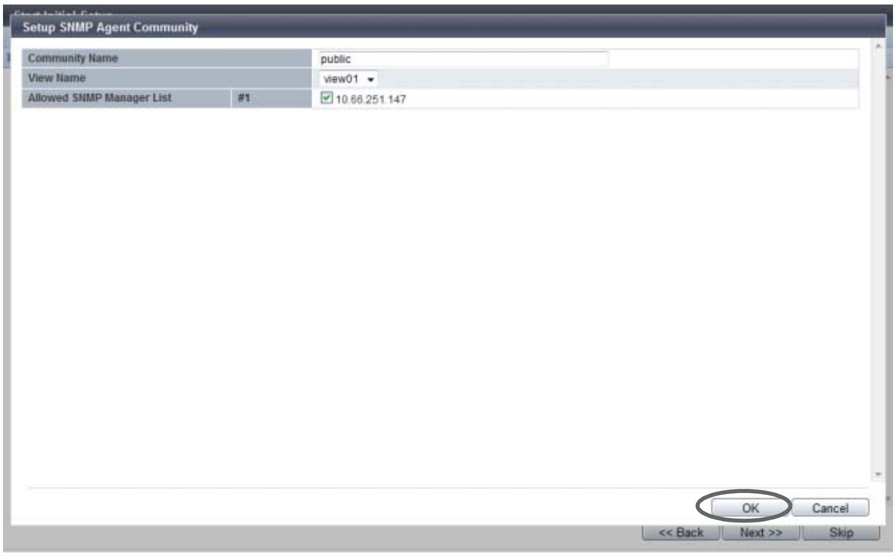
The [Set SNMP Agent Community] function must be set when using SNMPv1 or SNMPv2c in SNMP communication between the SNMP Agent and SNMP Manager. The SNMP Agent Community setting is not necessary when using SNMPv3 only.

Note

Click the [Skip] button to proceed to the next screen without setting.

7-2 Specify the following items, and click the [OK] button.

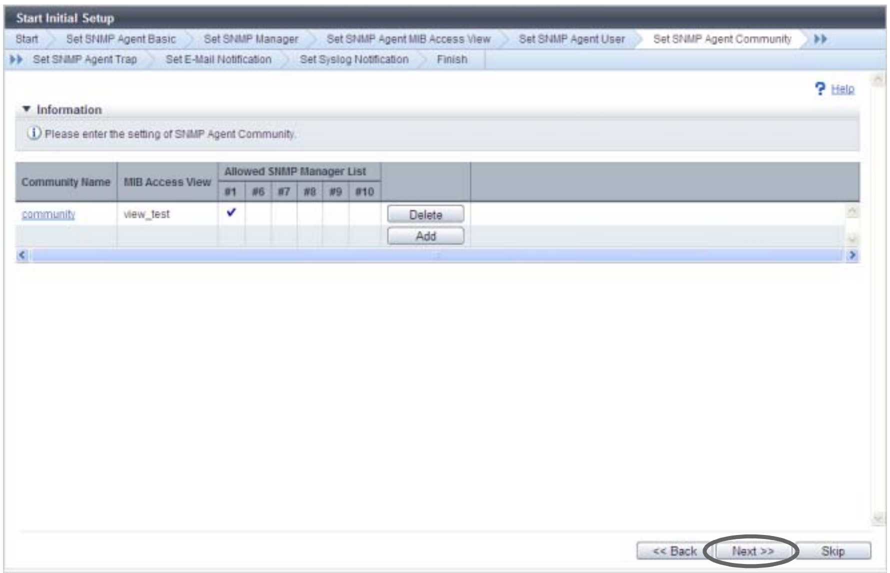
- Community Name
- View Name
- Allowed SNMP Manager List



→ Returns to the original screen.

7-3 Repeat Step 7-1 and Step 7-2 to configure multiple communities.

7-4 When the setting of the community is complete, click the [Next >>] button.



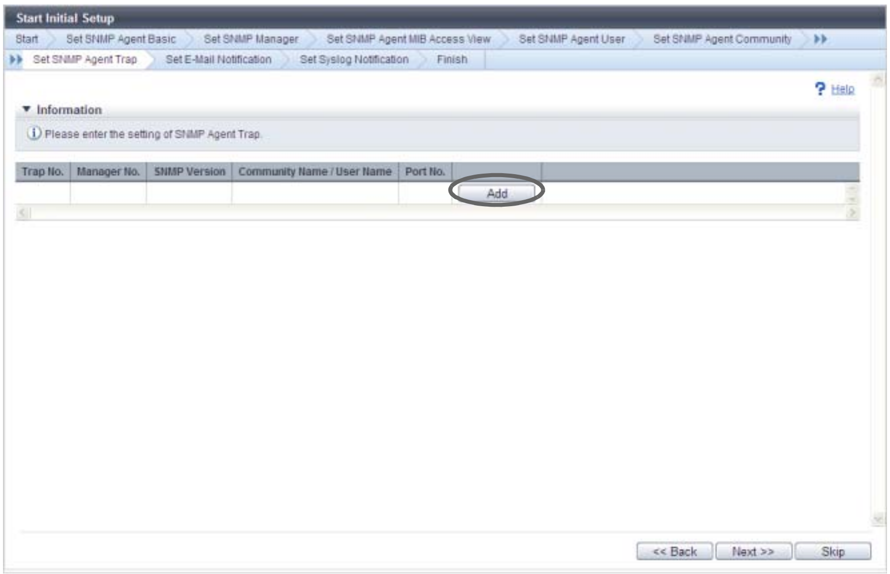
→ A confirmation screen appears.

7-5 Click the [OK] button.
→ Setting of the SNMP Agent Community starts.

7-6 Click the [Done] button.

8 Proceed to [Set SNMP Agent Trap].

8-1 Click the [Add] button.

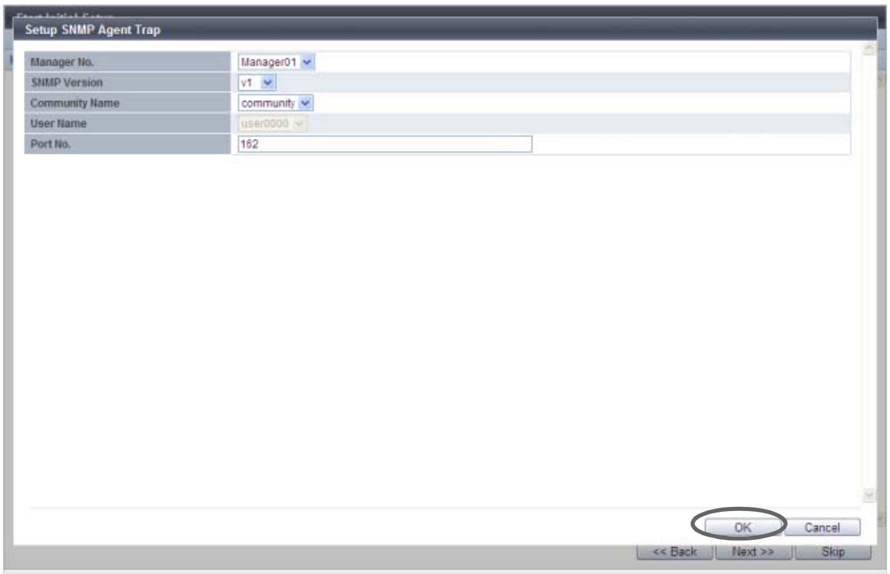


Note

Click the [Skip] button to proceed to the next screen without setting.

8-2 Specify the following items, and click the [OK] button.

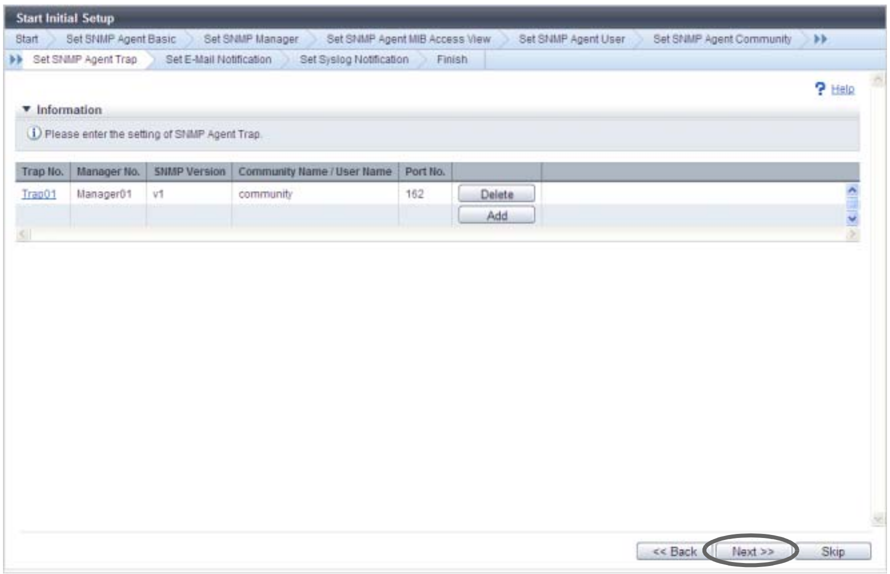
- Manager No.
- SNMP Version
- Community Name
- User Name
- Port No.



→ Returns to the original screen.

8-3 Repeat Step 8-1 and Step 8-2 to configure information for multiple traps.

8-4 When the setting of the trap information is complete, click the [Next >>] button.



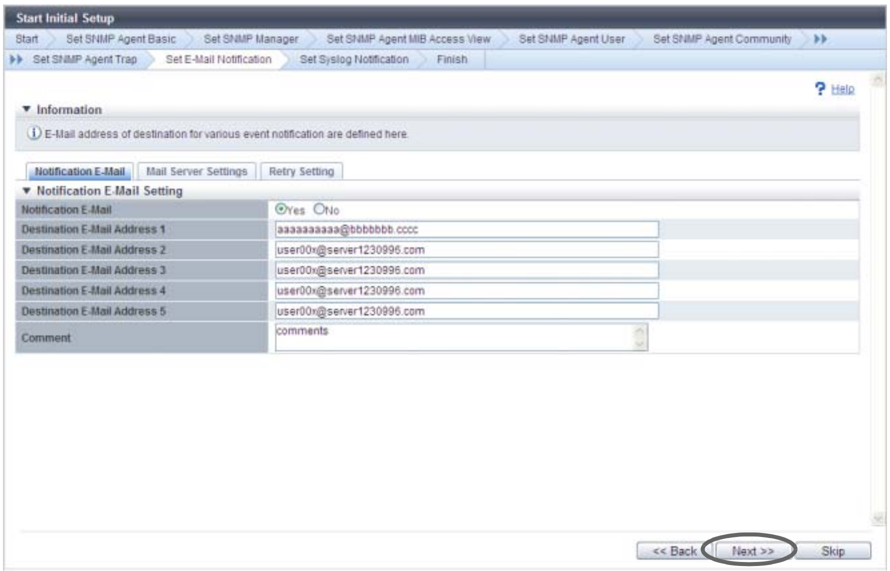
→ A confirmation screen appears.

8-5 Click the [OK] button.
→ Setting of the SNMP Agent Trap starts.

8-6 Click the [Done] button.

9 Proceed to [Set E-Mail Notification].

9-1 Specify the following items, and click the [Next >>] button.
- Notification E-Mail
- Mail Server Settings
- Retry Setting



→ A confirmation screen appears.

Note

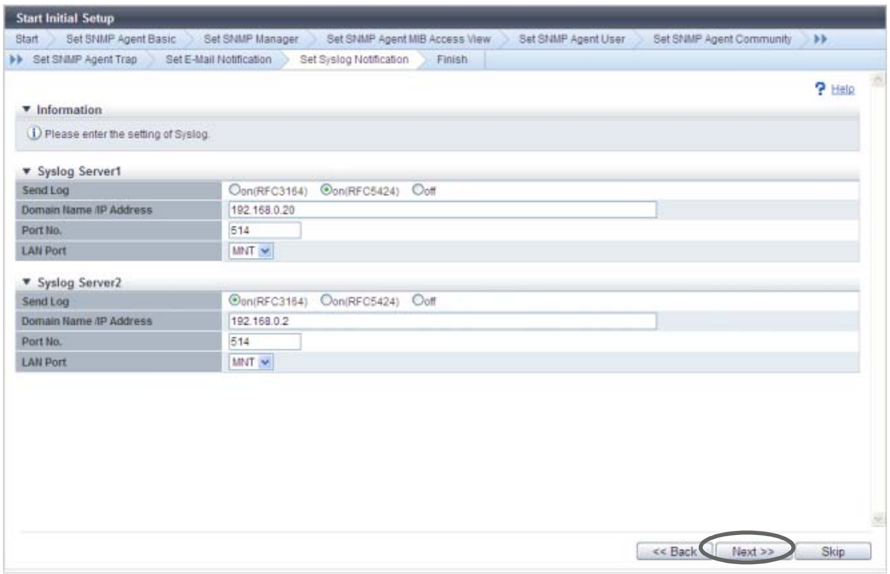
Click the [Skip] button to proceed to the next screen without setting.

9-2 Click the [OK] button.
→ Setting of the E-Mail Notification starts.

9-3 Click the [Done] button.

10 Proceed to [Set Syslog Notification].

10-1 Specify the following items, and click the [Next >>] button.
- Send Log
- Domain Name / IP Address
- Port No.
- LAN Port



→ A confirmation screen appears.

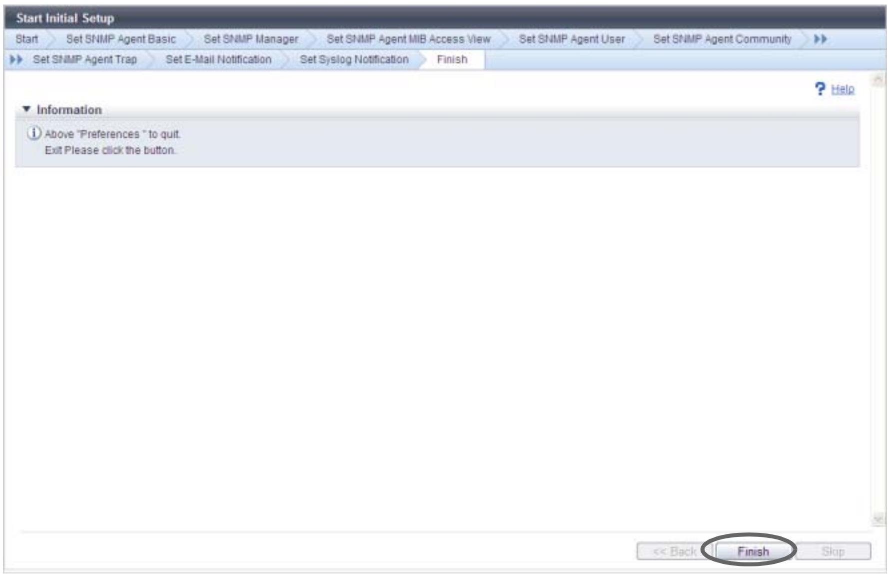
Note

Click the [Skip] button to proceed to the next screen without setting.

10-2 Click the [OK] button.
→ Setting of the Syslog starts.

10-3 Click the [Done] button.
→ A completed screen appears.

11 Click the [Finish] button.



→ Initial Setup 2 is complete, and the [Overview] screen appears.

End of procedure

Chapter 4
Configuration Settings

This chapter describes the following configuration settings:

- Configuration settings for using Standard volumes (when using host affinity settings)
- Configuration settings for using Standard volumes (when using host affinity settings, previously referred to as LUN mapping)
- Configuration settings for using Thin Provisioning functions

4.1 Configuration Settings for Using Standard Volumes (When Using Host Affinity Settings)

There are two methods to set the host affinity; one method creates a host group and sets the host affinity (by using the [Add Host Group] function). The other method sets the host affinity without creating a host group (by using the [Add Host] function). Use the procedure that does not create a host group only if the previous procedure for registering hosts in older storage systems (such as the ETERNUS DX410/DX440 or the ETERNUS DX8100/DX8400/DX8700) is used.

4.1.1 When Creating Host Groups (when Using the [Add Host Group] Function)

The following section describes the series of settings when creating host groups and using Standard volumes. Not only can new RAID groups be created, adding or changing volumes that are registered in existing RAID groups can also be performed.

1

Create RAID Group

Create a RAID group (a group of drives that configures the RAID in the ETERNUS DX Disk storage system).

Refer to:

- Create RAID Group

2

Create Volume

Create a volume (drive area in the RAID group). A volume is a structural unit of RAID that can be recognized from the server. Select "Standard" for "Type".

Refer to:

- Create Volume

3

Add Host Group

Add the information of any server that accesses the ETERNUS DX Disk storage system via the ports. When adding a server, create a host group (a host (HBA) group that accesses the same LUN group). Assign a host response when creating a host group.

When creating new host groups, refer to:

- Add FC/FCoE Host Group
- Add iSCSI Host Group
- Add SAS Host Group

When adding hosts to existing host groups, refer to:

- Modify Host Group

Note

The concept of host connection settings are described in "Chapter 9 Connectivity Management" (page 367). Refer to "Structures for Host Connection" (page 368) for details.

4

Create CA Port Group

Create a CA port group (a group of CA ports that are connected to the specified host group) that is used for the server to access the ETERNUS DX Disk storage system.

Refer to:

- Create FC Port Group
- Create iSCSI Port Group
- Create SAS Port Group
- Create FCoE Port Group

5

Add LUN Group

Create a LUN group (a group of volumes that are recognized from the server, which is conventionally referred to as an "affinity group").
Correspond the volume number to the Logical Unit Number (LUN) that can be recognized by the host for each LUN group.
LUN groups are recognized from the server by the host affinity setting that allocates the CA port groups and the LUN groups to the host group.

Refer to:

- Add LUN Group

6

Create Host Affinity

To recognize the LUN group from the server, allocate the host groups with the CA port groups and the LUN groups.

Refer to:

- Create Host Affinity

4.1.2 When Host Groups are not Created (when Using the [Add Host] Function)

The following section describes the series of settings when using Standard volumes without creating host groups.
Not only can new RAID groups be created, adding or changing volumes that are registered in existing RAID groups can also be performed.

1

Create RAID Group

Create a RAID group (a group of drives that configures the RAID in the ETERNUS DX Disk storage system).

Refer to:

- Create RAID Group

2

Create Volume

Create a volume (drive area in the RAID group). A volume is a structural unit of RAID that can be recognized from the server. Select "Standard" for "Type".

Refer to:

- Create Volume

3

Add Host

Add the information of any server that accesses the ETERNUS DX Disk storage system via the ports. When adding a server, register a new host. Assign a host response when registering a host.

Refer to:

- Add FC/FCoE Host
- Add iSCSI Host
- Add SAS Host

Caution

The "Add Host" functions are only displayed when the "Use "Add Host"" checkbox is selected for the "Function to Add Host" field in "Web GUI Settings". This item is not selected (not displayed) by default. Refer to "11.2.13.4 Setup Subsystem Parameters" (page 935) for details.

4

Add LUN Group

Create a LUN group (a group of volumes that are recognized from the server, which is conventionally referred to as an "affinity group").
Correspond the volume number to the Logical Unit Number (LUN) that can be recognized by the host for each LUN group.
LUN groups are recognized from the server by the host affinity setting that allocates the CA ports and the LUN groups to the host.

Refer to:

- Add LUN Group

5

Create Host Affinity

To recognize the LUN group from the server, allocate the host with the CA ports and LUN groups.

Refer to:

- Create Host Affinity

4.2 Configuration Settings for Using Standard Volumes (When Using Host Affinity Settings, Previously Referred to as LUN Mapping)

LUNs can be allocated to either CA port groups or CA ports.

4.2.1 When Allocating the CA port Group to the LUN Group

The following section describes the series of settings when creating CA port groups and using Standard volumes.
Not only can new RAID groups be created, adding or changing volumes that are registered in existing RAID groups can also be performed.

1

Create RAID Group

Create a RAID group (a group of drives that configures the RAID in the ETERNUS DX Disk storage system).

Refer to:

- Create RAID Group

2

Create Volume

Create a volume (drive area in the RAID group). A volume is a structural unit of RAID that can be recognized from the server. Select "Standard" for "Type".

Refer to:

- Create Volume

3

Create CA Port Group

Create a CA port group (a group of CA ports that are connected to the specified host group) that is used for the server to access the ETERNUS DX Disk storage system.

Refer to:

- Create FC Port Group
- Create iSCSI Port Group
- Create SAS Port Group
- Create FCoE Port Group

Note

The concept of host connection settings are described in "Chapter 9 Connectivity Management" (page 367). Refer to "Structures for Host Connection" (page 368) for details.

4

Add LUN Group

Create a LUN group (a group of volumes that are recognized from the server, which is conventionally referred to as an "affinity group").

Correspond the volume number to the Logical Unit Number (LUN) that can be recognized by the host for each LUN group.

LUN groups are recognized from the server by the host affinity setting that allocates the CA port groups to the LUN groups.

Refer to:

- Add LUN Group

5

Create Host Affinity

To recognize the LUN group from the server, select "All" for the host group and allocate the CA port group and the LUN group.

Refer to:

- Create Host Affinity

4.2.2 When Allocating the CA port to the LUN Group

The following section describes the series of settings when using Standard volumes without creating CA port groups.
Not only can new RAID groups be created, adding or changing volumes that are registered in existing RAID groups can also be performed.

1

Create RAID Group

Create a RAID group (a group of drives that configures the RAID in the ETERNUS DX Disk storage system).

Refer to:

- Create RAID Group

2

Create Volume

Create a volume (drive area in the RAID group). A volume is a structural unit of RAID that can be recognized from the server. Select "Standard" for "Type".

Refer to:

- Create Volume

3

Add LUN Group

Create a LUN group (a group of volumes that are recognized from the server, which is conventionally referred to as an "affinity group").
Correspond the volume number to the Logical Unit Number (LUN) that can be recognized by the host for each LUN group.
LUN groups are recognized from the server by the host affinity setting that allocates the CA ports to the LUN groups.

Refer to:

- Add LUN Group

4

Create Host Affinity

To recognize the LUN group from the server, select "All" for the host and allocate the CA port and the LUN group.

Refer to:

- Create Host Affinity

4.3 Configuration Settings for Using Thin Provisioning Functions

The following section shows the series of settings that need to be performed to use Thin Provisioning functions.
Not only can new Thin Provisioning Pool be created, adding or changing volumes that are registered in the existing Thin Provisioning Pools can also be performed.

1

Register Thin Provisioning License

Register the license to use the Thin Provisioning function.

Refer to:

- Register Thin Provisioning License

2

Create Thin Provisioning Pool

Create a Thin Provisioning Pool (groups of drives (which are configured in RAID groups) that configure a Thin Provisioning Pool).

Refer to:

- Create Thin Provisioning Pool

3

Create Volume

Create a volume (physical drive area in the Thin Provisioning Pool). A volume is a structural unit of a Thin Provisioning Pool that can be recognized from the server. Select "Thin Provisioning" for "Type".

Refer to:

- Create Volume

4

Add Host

Recognize the volume from the server.

Refer to:

Refer to Step 3 onward in one of the following sections:

- "4.1 Configuration Settings for Using Standard Volumes (When Using Host Affinity Settings)" (page 63)
- "4.2 Configuration Settings for Using Standard Volumes (When Using Host Affinity Settings, Previously Referred to as LUN Mapping)" (page 68)

Caution

When using Thin Provisioning functions, monitoring of Thin Provisioning Pool usage is important. Make sure that the Thin Provisioning Pool usage does not exceed the threshold. Refer to "7.1.1 Thin Provisioning Pool (Basic Information)" (page 200) for details.

Chapter 5
Volume Management

This chapter describes volume management.

5.1 Volume Status

Volume status displays the status information of volumes.
Volume status screens can be displayed by clicking the following categories:

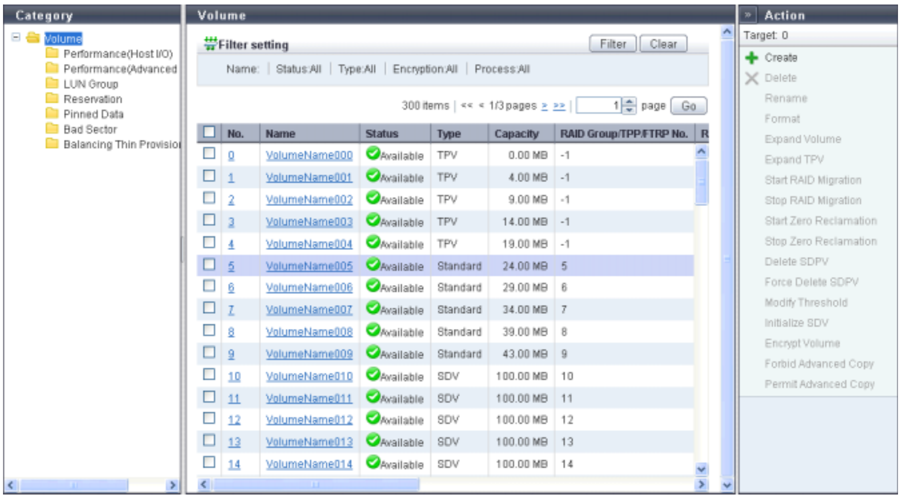
Volume status screen	Category
Volume (Basic Information)	Volume
Performance (Host I/O)	Performance (Host I/O)
Performance (Advanced Copy)	Performance (Advanced Copy)
LUN Group	LUN Group
Reservation	Reservation
Pinned Data	Pinned Data
Bad Sector	Bad Sector
Balancing Thin Provisioning Volume	Balancing Thin Provisioning Volume

Detailed information of the volumes can be displayed from the following screens:

- Volume Detail (Basic)
- Volume Detail (Reservation)
- Volume Detail (Pinned Data)
- Volume Detail (Balancing TPV)
- Volume Detail (LUN Concatenation)
- Volume Detail (WSV Concatenation)

5.1.1 Volume (Basic Information)

This function displays the basic information of volumes.



The following items are displayed in the Main area:

- No.
  The volume number is displayed.
  During volume creation, the volume number can be allocated automatically or specified manually. When the volume number is allocated automatically, the volume number is allocated from the smallest unused decimal number in ascending order.
  Click this item to display the [Volume Detail] screen. Refer to "5.1.9 Volume Detail (Basic)" (page 88) for display items.

- Name
  The volume name is displayed. Click this item to display the [Volume Detail] screen. Refer to "5.1.9 Volume Detail (Basic)" (page 88) for display items.

- Status
  The volume status is displayed. When the volume status is normal, " Available" is displayed. Refer to "B.2 Volume Status" (page 974) for detailed information of volume status.

- Type
  The volume type is displayed.
  - Standard
    Standard volume or volume that is used for general operations
  - WSV
    Wide Striping Volume that is configured by multiple RAID groups that are concatenated with striping to improve performance
  - TPV
    Thin Provisioning Volume
  - FTV
    Flexible Tier Volume
  - SDV
    Snap Data Volume
  - SDPV
    Snap Data Pool Volume

- Temporary
  A migration source volume that failed to delete after RAID migration is complete, a work volume that failed to delete after TPV balancing is complete, or a work volume that failed to delete after FTRP balancing is complete.

- Capacity
  The volume capacity is displayed.
  The capacity is displayed in units of "MB", "GB", or "TB". Even when volumes are created in units of "MB", if the volume capacity exceeds 1023.99MB, the capacity is displayed in units of "GB". If the volume capacity exceeds 1023.99GB, the capacity is displayed in units of "TB". The capacity is rounded off to two decimal places. To check the volume capacity in units of "MB", use CLI.

- RAID Group/TPP/FRTP No.
  The following number is displayed:
  - If the type is "WSV"
    The RAID group number to which the representative volume (*1) belongs is displayed.
    *1: A volume for WSV, which is created by concatenating multiple RAID groups with striping, that belongs to the RAID group that is first in the concatenation order.
  - If the type is "TPV"
    The Thin Provisioning Pool (TPP) number to which the volume belongs is displayed.
  - If the type is "FTV"
    The Flexible Tier Pool (FTRP) number to which the volume belongs is displayed.
  - If the type is not one of the types listed above
    The RAID group number to which the volume belongs is displayed.

- RAID Group/TPP/FTRP Name
  The following name is displayed:
  - If the type is "WSV"
    The RAID group name to which the representative volume belongs is displayed.
  - If the type is "TPV"
    The Thin Provisioning Pool (TPP) name to which the volume belongs is displayed.
  - If the type is "FTV"
    The Flexible Tier Pool (FTRP) name to which the volume belongs is displayed.
  - If the type is not one of the types listed above
    The RAID group name to which the volume belongs is displayed.

- Encryption
  The encryption status is displayed.
  - CM
    A volume that is encrypted by CM
  - "-" (hyphen)
    A volume that is not encrypted (plain text volume)
  - SED
    A volume that is encrypted by SED

- UID
  The Universal Identifier (UID) is displayed.
  The UID is an identifier (storage system name) to specify a volume from the open system server. A UID is created from the WWN of the ETERNUS DX Disk storage system and a volume number.

- Process
  A process that is being performed for the volume is displayed.
  If multiple processes are being performed, the processes are separated with a ": (colon)" and displayed using ("xx:yy"). "Encrypting", "Formatting", "Migrating", or "Balancing" is displayed as "xx". "Zero Reclaiming" or "Reserved Zero Reclaim" is displayed as "yy".
  If no process is being performed, a "-" (hyphen) is displayed.
  - Encrypting
    Volume encryption is being performed.
  - Formatting
    Formatting is being performed.
  - Migrating
    RAID migration is being performed.
  - Balancing
    TPV balancing or FTRP balancing is being performed.
  - Zero Reclaiming
    Zero Reclamation (*1) is being performed for a TPV or an FTV.
  - Reserved Zero Reclaim
    A TPV or an FTV is reserved for Zero Reclamation (*2).

  *1: "Zero Reclamation" is a function that releases the allocated physical area when data in the physical area that is allocated to a TPV or an FTV is filled with zeros.

  *2: When "Start Zero Reclamation after migration" is enabled for RAID migration, the source volume will be reserved for Zero Reclamation.

- Forbid Advanced Copy
  The protection status of the volume or the volume attribute (such as mirroring reservation) is displayed.
  - Yes
    The volume is protected. The volume cannot be used as a copy destination volume.
  - No
    The volume is not protected. The volume can be used as a copy destination volume.
  - DLM (Dynamic LUN Mirroring)
    An attribute that is to be set to a volume being created as the REC copy destination by the Dynamic LUN Mirroring function regardless of whether the volume is protected. If this attribute is displayed, the volume might be the one that is left in the storage system due to unsuccessful creation.
  - ODX (Offloaded Data Transfer)
    An ODX Buffer volume. ODX Buffer volumes cannot be protected.

Filter setting

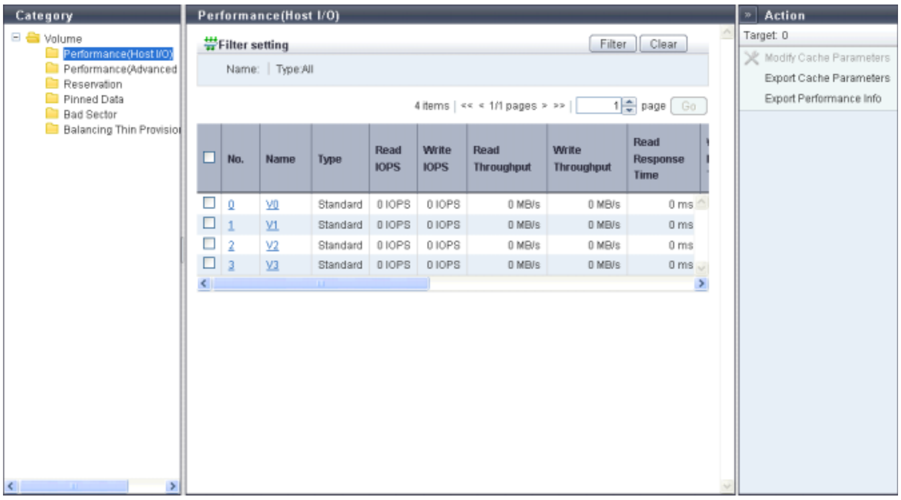
Filter	Description
Name	Input the volume name that is to be displayed. When not using the volume name for filtering, leave this item blank.
Status	Select the volume status that is to be displayed.
Type	Select the volume type that is to be displayed.
Encryption	Select the encryption status of the volume that is to be displayed.
Process	Select which current process for the volume is to be displayed.

5.1.2 Performance (Host I/O)

This function displays the performance information of the volumes for Host I/O.

Note

- Performance information is obtained when performance monitoring is operated from GUI, CLI, or any other monitoring software. Refer to "11.2.12.4 Start/Stop Performance Monitoring" (page 925) for details on how to start performance monitoring with GUI.
- The interval for acquiring performance information can be specified when starting the monitoring. When using GUI, the default interval is 30 seconds.
- The average performance values during the specified interval are displayed.



The following items are displayed in the Main area:

- No.
  The volume number is displayed. Click this item to display the [Volume Detail] screen.
- Name
  The volume name is displayed. Click this item to display the [Volume Detail] screen.
- Type
  The volume type is displayed.
  - Standard
  - WSV
  - TPV
  - FTV
  - SDV
  - SDPV
- Read IOPS
  The read count per second is displayed.
- Write IOPS
  The write count per second is displayed.
- Read Throughput
  The amount of transferred data that is read per second is displayed.

- Write Throughput
  The amount of transferred data that is written per second is displayed.
- Read Response Time
  The average response time (for read) per millisecond is displayed.
- Write Response Time
  The average response time (for write) per millisecond is displayed.
- Read Cache Hit Rate
  The cache hit rate (for read) is displayed.
- Write Cache Hit Rate
  The cache hit rate (for write) is displayed.
- Prefetch Cache Hit Rate
  The cache hit rate (for prefetch) is displayed.
- Cache Page Capacity
  The cache page capacity is displayed.
  When the cache page capacity is "-" (hyphen), there is no limit for the cache capacity.
- PL
  The prefetch limit is displayed. If PL is "0", prefetch is not performed.
- FP
  The selected usage for the Force Prefetch Mode, which performs forcible prefetching for cache, is displayed.
  - ON
    Perform prefetch even if the sequential characteristics of the data access is not detected.
  - OFF
    Perform prefetch only when the sequential characteristics of the data access is detected.
- MWC
  The value of the Multi Write back Count is displayed.
- PSDC
  The number of times that sequentiality of data access (Read I/O) is detected (value of the Prefetch Sequential Detect Count) is displayed. If any sequential data is accessed for the number of times specified for PSDC, such access is determined as sequential access and prefetch is performed.
- SDDC
  The number of times that sequentiality of data access (Write I/O) is detected (value of the Sequential Dirty Detect Count) is displayed. If any sequential data is accessed for the number of times specified for SDDC, such access is determined as sequential access and prefetch is performed.
- SS
  The value of the parameter (Sequential Slope) to determine the sequentiality of data access (Read I/O) is displayed. If the difference in addresses between the end LBA of the previous I/O and the start LBA of the current I/O is within (SS setting + 1), it is determined as sequential data.
- SDS
  The value of the parameter (Sequential Dirty Slope) to determine the sequentiality of data access (Write I/O) is displayed. If the difference in addresses between the end LBA of the previous I/O and the start LBA of the current I/O is within (SDS setting + 1), it is determined as sequential data.

Filter setting

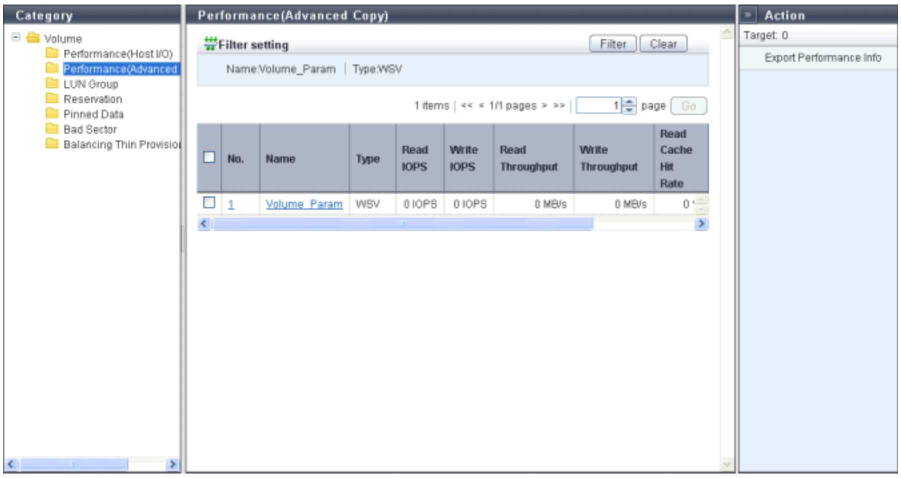
Filter	Description
Name	Input the volume name that is to be displayed. When not using the volume name for filtering, leave this item blank.
Type	Select the volume type that is to be displayed.

5.1.3 Performance (Advanced Copy)

This function displays the performance information of the volumes for Advanced Copy.

Note

- Performance information is obtained when performance monitoring is operated from GUI, CLI, or any other monitoring software. Refer to "11.2.12.4 Start/Stop Performance Monitoring" (page 925) for details on how to start performance monitoring with GUI.
- The interval for acquiring performance information can be specified when starting the monitoring. When using GUI, the default interval is 30 seconds.
- The average performance values during the specified interval are displayed.



The following items are displayed in the Main area:

- No.
  The volume number is displayed. Click this item to display the [Volume Detail] screen.
- Name
  The volume name is displayed. Click this item to display the [Volume Detail] screen.
- Type
  The volume type is displayed.
  - Standard
  - WSV
  - TPV
  - FTV
  - SDV
  - SDPV

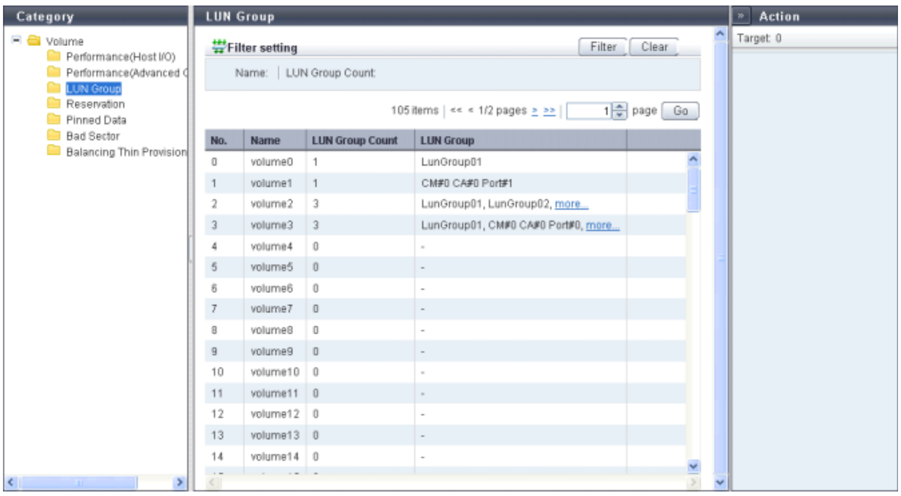
- Read IOPS
  The read count per second is displayed.
- Write IOPS
  The write count per second is displayed.
- Read Throughput
  The amount of transferred data that is read per second is displayed.
- Write Throughput
  The amount of transferred data that is written per second is displayed.
- Read Cache Hit Rate
  The cache hit rate (for read) is displayed.
- Write Cache Hit Rate
  The cache hit rate (for write) is displayed.
- Prefetch Cache Hit Rate
  The cache hit rate (for prefetch) is displayed.

Filter setting

Filter	Description
Name	Input the volume name that is to be displayed. When not using the volume name for filtering, leave this item blank.
Type	Select the volume type that is to be displayed.

5.1.4 LUN Group

This function displays the LUN groups of each volume.
A LUN group is a group of Logical Unit Numbers (LUNs), which can be recognized by the host. The allocation information of LUNs and volumes in the ETERNUS DX Disk storage system are configured to the LUN group.



The following items are displayed in the Main area:

- No.
  The volume number is displayed.

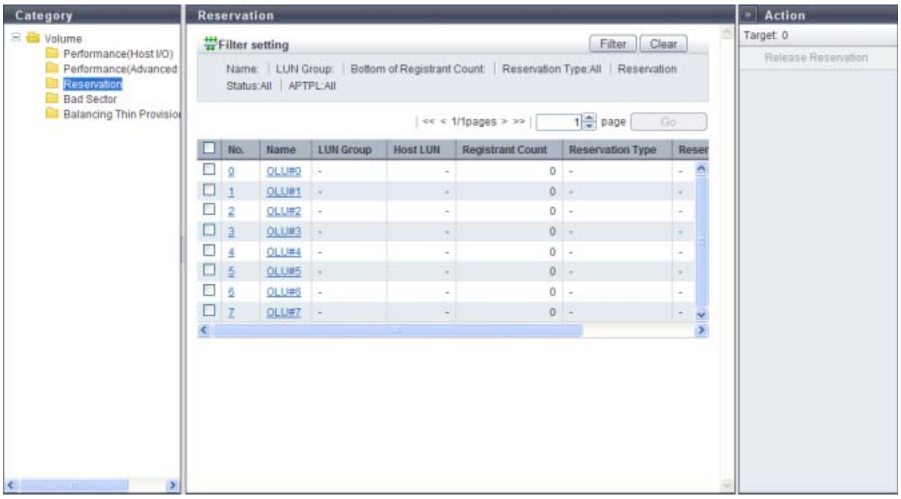
- Name
  The volume name is displayed.
- LUN Group Count
  The total number of LUN groups for the volume and the number of ports to which the volume is allocated is displayed.
- LUN Group
  The LUN group names of the volume are displayed. If the host, ports, and LUNs are allocated without specifying a host group or CA port group, the location information of the ports is displayed.
  If the volume is registered in multiple LUN groups or the volume is allocated to multiple ports, the display contents vary depending on the number of LUN groups and the number of ports. When there are two display targets (the LUN group name and the port location information), the items are separated with a ", (comma)" and displayed. When there are three or more display targets (the LUN group name and the port location information), the first two items and a [more...] link are displayed.
  When the volume does not belong to any LUN groups, or the volume is not allocated to any ports, the field is blank.
  - LUN group name
  - CM#x CA#y Port#z (x: CM number, y: CA number, z: Port number)

Filter setting

Filter	Description
Name	Input the volume name that is to be displayed. When not using the volume name for filtering, leave this item blank.
LUN Group	Input the LUN group name that is to be displayed. When not using the LUN group name for filtering, leave this item blank.

5.1.5 Reservation

This function displays the reservation status of the volumes that are specified by a host.



The following items are displayed in the Main area:

- No.
  The volume number is displayed. Click this item to display the [Volume Detail] screen.
  Refer to "5.1.10 Volume Detail (Reservation)" (page 90) for display items.

- Name
  The volume name is displayed. Click this item to display the [Volume Detail] screen.
  Refer to "5.1.10 Volume Detail (Reservation)" (page 90) for display items.

- LUN Group
  When the host affinity setting is specified for a host that reserves the volume, the LUN group name is displayed. If the host, ports, and LUNs are directly allocated (mapped), the location information of the ports is displayed.
  When the volume is not reserved, a "-" (hyphen) is displayed.
  - LUN group name
  - CM#x CA#y Port#z (x: CM number, y: CA number, z: Port number)

- Host LUN
  The logical unit number that is allocated to the relevant volume is displayed.
  When the volume is not reserved, a "-" (hyphen) is displayed.

- Registrant Count
  The number of reservation keys registered in the volume is displayed.

- Reservation Type
  When the volume is in persistent reservation status, one of the following persistent reservation types is displayed. When the volume is in reservation status other than persistent reservation status, or when the volume is not reserved, a "-" (hyphen) is displayed.
  - WE (Write Exclusive)
  - EA (Exclusive Access)
  - WE_RO (Write Exclusive-Registrants Only)
  - EA_RO (Exclusive Access-Registrants Only)
  - WE_AR (Write Exclusive-All Registrants)
  - EA_AR (Exclusive Access-All Registrants)

- Reservation Status
  The volume reservation status is displayed.
  - Yes
    In persistent reservation status
  - No
    In reservation status, but not in persistent reservation status
  - "-" (hyphen)
    Not in reservation status

- APTPL (*1)
  Whether or not persistent reservation information is kept after the ETERNUS DX Disk storage system has been shutdown/rebooted is displayed. When the volume is in reservation status other than persistent reservation status, "No" is displayed. When the volume is not reserved, a "-" (hyphen) is displayed.
  *1: Activate Persist Through Power Loss
  - Yes
    The persistent reservation information is kept.
  - No
    The persistent reservation information is not kept.

Filter setting

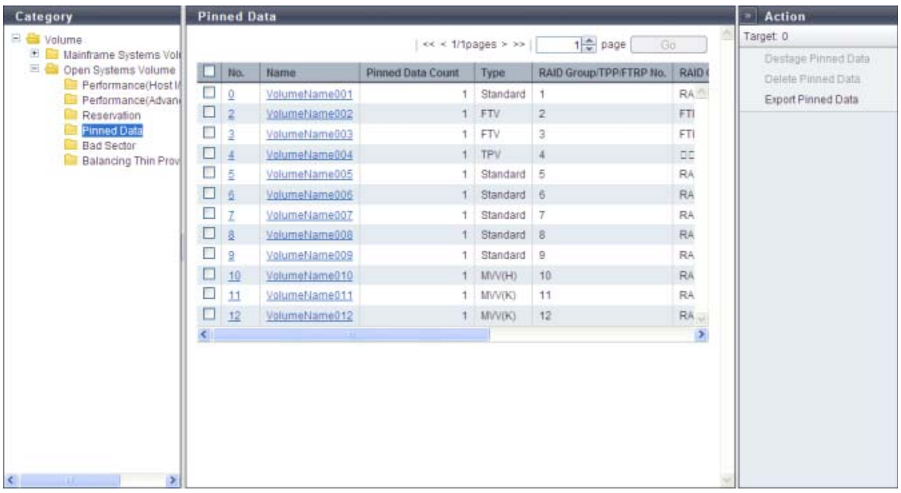
Filter	Description
Name	Input the volume name that is to be displayed. When not using the volume name for filtering, leave this item blank.
LUN Group	Input the LUN group name or the port location information that is to be displayed. When not using the LUN group name or port location information for filtering, leave this item blank.
Bottom of Registrant Count	Input the minimum number of reservation keys for the volume that is to be displayed. When not using the bottom of the registrant count, leave this item blank.
Reservation Type	Select the reservation type that is to be displayed.
Reservation Status	Select the status of reservations that is to be displayed.
APTPL	Select the APTPL that is to be displayed.

5.1.6 Pinned Data

Volumes including pinned data are displayed.
"Pinned data" is the data left in the cache memory due to unsuccessful write-back to the volume from the cache memory.

Note

When a system message that indicates the detection of pinned data is displayed in the [Overview] screen, or when a "Pinned data" event is notified by Host Sense or SNMP Trap, use this function to check the detected pinned data.
Use the [Setup Event Notification] function to specify whether to perform event notification when pinned data is detected. Refer to "11.2.9.1 Setup Event Notification" (page 880) for details. Note that writing back, deleting, and saving pinned data can be performed by a maintenance engineer who has the "Maintenance Operation" policy.



The following items are displayed in the Main area:

- No.
  The volume number is displayed. Click this item to display the [Volume Detail] screen.
  Refer to "5.1.11 Volume Detail (Pinned Data)" (page 91) for display items.

- Name
  The volume name is displayed. Click this item to display the [Volume Detail] screen.
  Refer to "5.1.11 Volume Detail (Pinned Data)" (page 91) for display items.

- Pinned Data Count
  The number of pinned data is displayed.

- Type
  The volume type is displayed.
  - Standard
  - WSV
  - TPV
  - FTV
  - SDV
  - SDPV
  - Temporary

- RAID Group/TPP/FRTP No.
  The following number is displayed:
  - If the type is "WSV"
    The RAID group number to which the representative volume (*1) belongs is displayed.
    *1: A volume for WSV, which is created by concatenating multiple RAID groups with striping, that belongs to the RAID group that is first in the concatenation order.
  - If the type is "TPV"
    The Thin Provisioning Pool (TPP) number to which the volume belongs is displayed.
  - If the type is "FTV"
    The Flexible Tier Pool (FTRP) number to which the volume belongs is displayed.
  - If the type is not one of the types listed above
    The RAID group number to which the volume belongs is displayed.

- RAID Group/TPP/FTRP Name
  The following name is displayed:
  - If the type is "WSV"
    The RAID group name to which the representative volume belongs is displayed.
  - If the type is "TPV"
    The Thin Provisioning Pool (TPP) name to which the volume belongs is displayed.
  - If the type is "FTV"
    The Flexible Tier Pool (FTRP) name to which the volume belongs is displayed.
  - If the type is not one of the types listed above
    The RAID group name to which the volume belongs is displayed.

- Controlling CM
  The controlling CM and the CPU of the volume are displayed.

5.1.7 Bad Sector

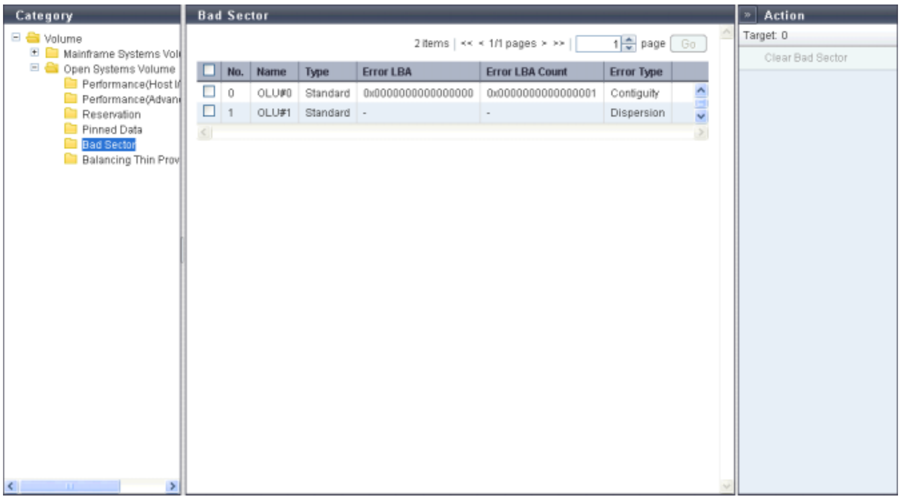
The bad sector information is displayed.

Caution

Drives are not monitored for bad sectors when the drives configure the REC Disk Buffer.

Note

- When data for rebuild, copyback, or redundant copy is not read normally, bad sector information is recorded.
- When a system message that indicates the detection of bad sector is displayed in the [Overview] screen or when a "Bad data" event is notified by Host Sense or an SNMP Trap, use this screen to check the detected bad sector.
  Use the [Setup Event Notification] function to specify whether to perform event notification when a bad sector is detected. Refer to "11.2.9.1 Setup Event Notification" (page 880) for details. Note that the deletion of bad sector can be performed by a maintenance engineer who has the "Maintenance Operation" policy.



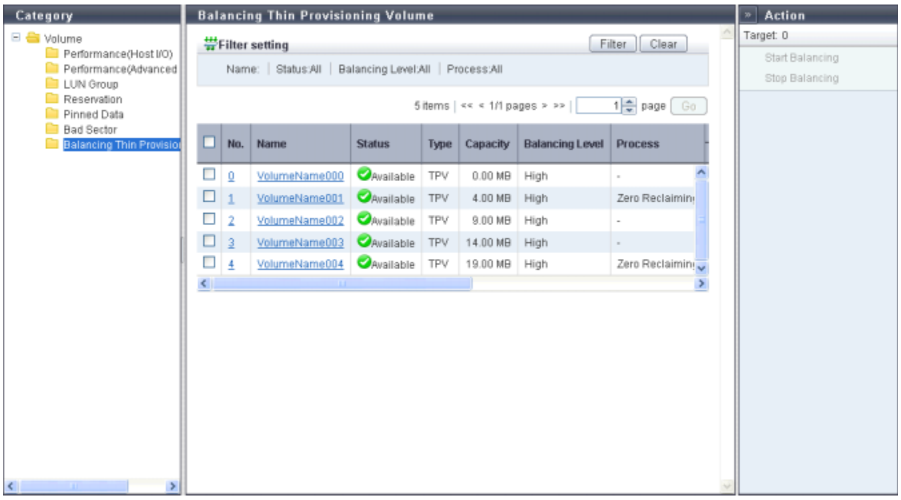
The following items are displayed in the Main area:

- No.
  The volume number is displayed.
- Name
  The volume name is displayed.
  When the volume type is WSV or when the volume is concatenated by LUN concatenation, "Volume name (n/m)" (n: nth volume in the concatenation order, m: number of concatenated volumes) is displayed.

- Type
  The volume type is displayed.
  - Standard
  - WSV
  - TPV
  - FTV
  - SDV
  - SDPV
  - Temporary
- Error LBA
  The start position of the bad sector information in the volume is displayed using the Logical Block Address (LBA).
  - When bad sector information is detected in the TPV or the FTV: "-" (hyphen)
  - When the "Error Type" is "Dispersion": "-" (hyphen)
- Error LBA Count
  The number of LBAs from Error LBA of the bad sector information in the volume is displayed.
  - When bad sector information is detected in the TPV or the FTV: "-" (hyphen)
  - When the "Error Type" is "Dispersion": "-" (hyphen)
- Error Type
  The number of bad sector information in the volume is displayed.
  - When one bad sector information exists in the volume: "Contiguity"
  - When multiple number of bad sector information exist in the volume: "Dispersion"
  - For TPV or FTV, "Dispersion" is displayed regardless of the number of bad sector information.

5.1.8 Balancing Thin Provisioning Volume

This function displays the information of balancing Thin Provisioning Volumes (TPVs).



The following items are displayed in the Main area:

- No.
  The volume number is displayed. Click this item to display the [Volume Detail] screen.
  Refer to "5.1.12 Volume Detail (Balancing TPV)" (page 92) for display items.

- Name
  The volume name is displayed. Click this item to display the [Volume Detail] screen.
  Refer to "5.1.12 Volume Detail (Balancing TPV)" (page 92) for display items.

- Status
  The volume status is displayed. Refer to "B.2 Volume Status" (page 974) for detailed information of volume status.

- Type
  The volume type (fixed to "TPV") is displayed.

- Capacity
  The total volume capacity is displayed.

- Balancing Level
  The balancing level of the volume is displayed.
  - When the volume is balanced: High
  - When the volume is almost balanced: Middle
  - When the volume is not balancing well: Low
  - When the ETERNUS DX Disk storage system is abnormal: "-" (hyphen)

- Process
  A process that is being performed for the volume is displayed.
  If multiple processes are being performed, the processes are separated with a ": (colon)" and displayed using ("xx:yy"). "Encrypting", "Formatting", "Migrating", or "Balancing" is displayed as "xx". "Zero Reclaiming" or "Reserved Zero Reclaim" is displayed as "yy".
  If no process is being performed, a "-" (hyphen) is displayed.
  - Balancing
    TPV balancing is being performed
  - Formatting
    Formatting is being performed
  - Migrating
    RAID migration is being performed
  - Zero Reclaiming
    Zero Reclamation (*1) is being performed for a TPV or an FTV.
  - Reserved Zero Reclaim
    A TPV or an FTV is reserved for Zero Reclamation (*2).

    *1: "Zero Reclamation" is a function that releases the allocated physical area when data in the physical area that is allocated to a TPV or an FTV is filled with zeros.

    *2: When "Start Zero Reclamation after migration" is enabled for RAID migration, the source volume will be reserved for Zero Reclamation.

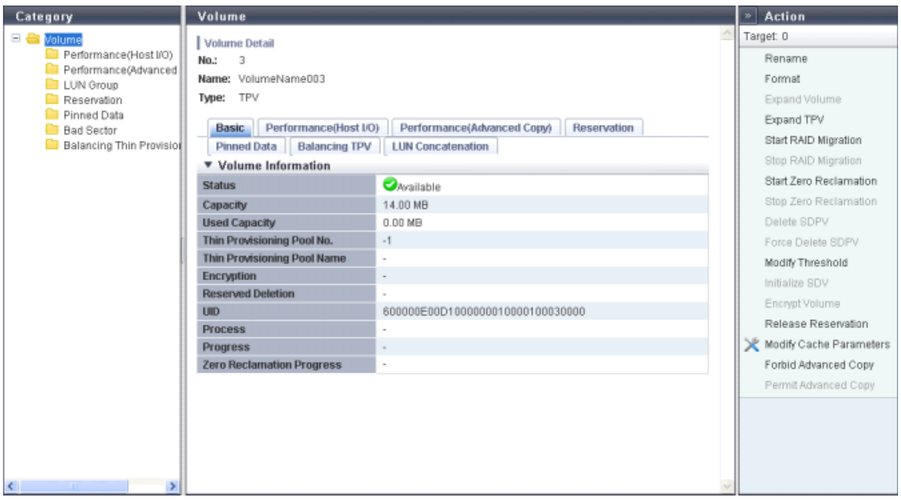
- Balancing Process
  When "Process" is not "Balancing", a "-" (hyphen) is displayed.
  - Status
    The status of TPV balancing is displayed.
    - Active
      Running normally
    - Error
      Stopped due to an error
  - Progress
    The progress of TPV balancing is displayed.
  - Work Vol. No.
    The volume number undergoing TPV balancing is displayed.
  - Work Vol. Name
    The volume name undergoing TPV balancing is displayed.
  - Error Code
    The error code of TPV balancing is displayed when an error occurs.
  - Elapsed Time
    The elapsed time of TPV balancing is displayed.
    The displayed time is the elapsed time at the point when this screen is displayed.

Filter setting

Filter	Description
Name	Input the volume name that is to be displayed. When not using the volume name for filtering, leave this item blank.
Status	Select the volume status that is to be displayed.
Balancing Level	Select the volume type that is to be displayed.
Process	Select which current process for the volume is to be displayed.

5.1.9 Volume Detail (Basic)

The detail information of the volume is displayed.



The following items are displayed in the Main area:

- Status
  The volume status is displayed.
  When the volume status is normal, " Available" is displayed.
  Refer to "B.2 Volume Status" (page 974) for detailed information of RAID group status.
- Capacity
  The volume capacity is displayed.
- Used Capacity
  The used capacity of volume is displayed.
  This item is not displayed when the volume type is other than "TPV" or "FTV".
- RAID Group No.
  The RAID group number to which the volume belongs is displayed.
  If the type is "WSV", the RAID group number to which the representative volume belongs is displayed.
  This item is not displayed when the volume type is "TPV" or "FTV".
- RAID Group Name
  The RAID group name to which the volume belongs is displayed.
  If the type is "WSV", the RAID group name to which the representative volume belongs is displayed.
  This item is not displayed when the volume type is "TPV" or "FTV".
- Thin Provisioning Pool No.
  The TPP number to which the volume belongs is displayed.
  This item is not displayed when the volume type is other than "TPV".
- Thin Provisioning Pool Name
  The TPP name to which the volume belongs is displayed.
  This item is not displayed when the volume type is other than "TPV".
- FTRP No.
  The FTRP name to which the volume belongs is displayed.
  This item is not displayed when the volume type is other than "FTV".
- FTRP Name
  The FTRP name to which the volume belongs is displayed.
  This item is not displayed when the volume type is other than "FTV".
- Encryption
  The encryption status is displayed.
  - CM
    The volume that is encrypted by CM.
  - "-" (hyphen)
    The volume that is not encrypted.
  - SED
    The volume that is encrypted by SED.
- Wide Stripe Size
  The Wide Stripe Size is displayed.
  "Wide Stripe Size" is the size of the WSV Unit that is allocated to each RAID group in series. A "-" (hyphen) is displayed when the volume type is other than "WSV".
  - Normal
    An integral multiple of the basic size for each RAID type (*1). The maximum size is 16MB or smaller.
  - Small
    An integral multiple of the basic size for each RAID type (*1). The maximum size is 2MB or smaller.
    Note that when the basic size for a RAID group is larger than 2MB, the basic size is specified.

    *1: The basic size (stripe size) when creating a volume. Refer to "E.1 Basic Size for each RAID Group" (page 995) for details.

- Reserved Deletion
  The "Reserved Deletion" status of the SDPV is displayed.
  If the SDPV is currently being used, the target SDPV status is changed to "Reserved Deletion". A "-" (hyphen) is displayed when the volume type is other than "SDPV". Refer to "5.2.11 Delete Snap Data Pool Volume" (page 141) for details.
  - Yes
    SDPVs are in "Reserved Deletion" status.
  - No
    SDPVs are not in "Reserved Deletion" status.
- UID
  The UID is displayed.
- Process
  A process that is being performed for the volume is displayed.
  If no process is being performed, a "-" (hyphen) is displayed.
  If multiple processes are being performed, the processes are separated with a ": (colon)" and displayed using ("xx:yy"). "Encrypting", "Formatting", "Migrating", or "Balancing" is displayed as "xx". "Zero Reclaiming" or "Reserved Zero Reclaim" is displayed as "yy".
  - Encrypting
  - Formatting
  - Migrating
  - Balancing
  - Zero Reclaiming
  - Reserved Zero Reclaim
- Progress
  The progress of a process that is being performed for the volume is displayed.
  If no process is being performed, a "-" (hyphen) is displayed.
- Zero Reclamation Progress
  The progress of a Zero Reclamation (*1) process that is being performed for the volume is displayed.
  When Zero Reclamation is not being executed, a "- " (hyphen) is displayed.
  When the storage system status is "Not Ready", the field is blank.

  *1: "Zero Reclamation" is a function that releases the allocated physical area when data in the physical area that is allocated to a TPV or an FTV filled with zeros.

5.1.10 Volume Detail (Reservation)

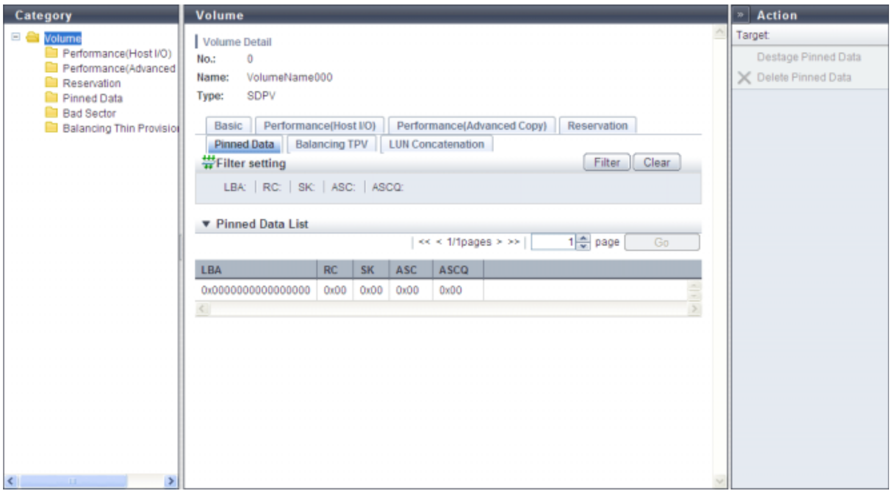
The detailed information of reservation volume is displayed.
The following items are displayed in the Main area:

- Host WWN/iSCSI Name
  The WWN or the iSCSI name of the host that can access the volume is displayed.
- CA Port
  The location information of the CA port that connects to the host is displayed.
  - CM#x CA#y Port#z (x: CM number, y: CA number, z: Port number)
- Reservation Key
  The reservation key that is used for persistent reservation of the volume is displayed.
  When no reservation keys exist, a "-" (hyphen) is displayed.

- Hold Reservation
  Whether the target reservation key is used for persistent reservation is displayed.
  When the volume is in reservation status other than persistent reservation status, "No" is displayed.
  - Yes
    In persistent reservation status
  - No
    Not in persistent reservation status

5.1.11 Volume Detail (Pinned Data)

The detailed information of pinned data is displayed.



The following items are displayed in the Main area:

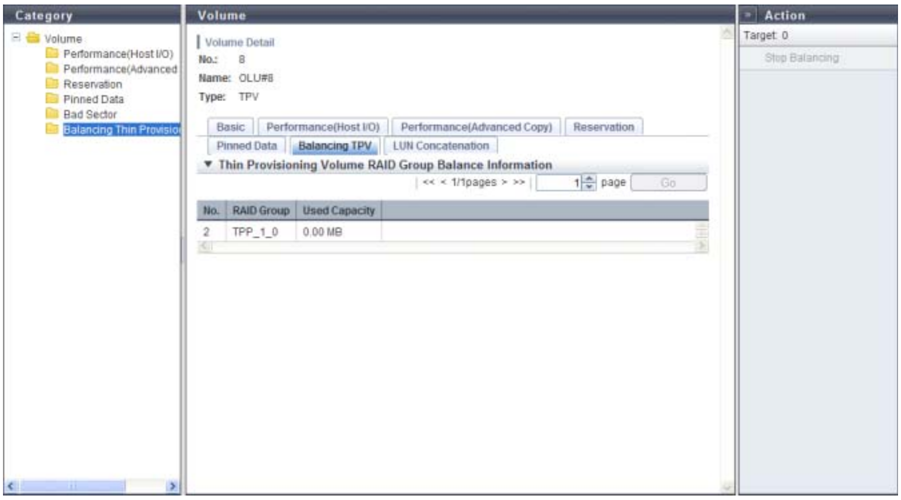
- LBA
  The location of the pinned data in the volume is displayed using the Logical Block Address (LBA).
- RC
  The reason (Reason Code) that created the pinned data is displayed.
- SK
  The Sense Key (SK) part is displayed from the sense information that is output when the pinned data is created.
- ASC
  Additional Sense Code (ASC) part is displayed from the sense information that is output when the pinned data is created.
- ASCQ
  Additional Sense Code Qualifier (ASCQ) part is displayed from the sense information that is output when the pinned data is created.

Filter setting

Filter	Description
LBA	Input the LBA that is to be displayed. When not using the LBA for filtering, leave this item blank.
RC	Input the RC that is to be displayed. When not using the RC for filtering, leave this item blank.
SK	Input the SK that is to be displayed. When not using the SK for filtering, leave this item blank.
ASC	Input the ASC that is to be displayed. When not using the ASC for filtering, leave this item blank.
ASCQ	Input the ASCQ that is to be displayed. When not using the ASCQ for filtering, leave this item blank.

5.1.12 Volume Detail (Balancing TPV)

The detailed information of TPV balancing is displayed.

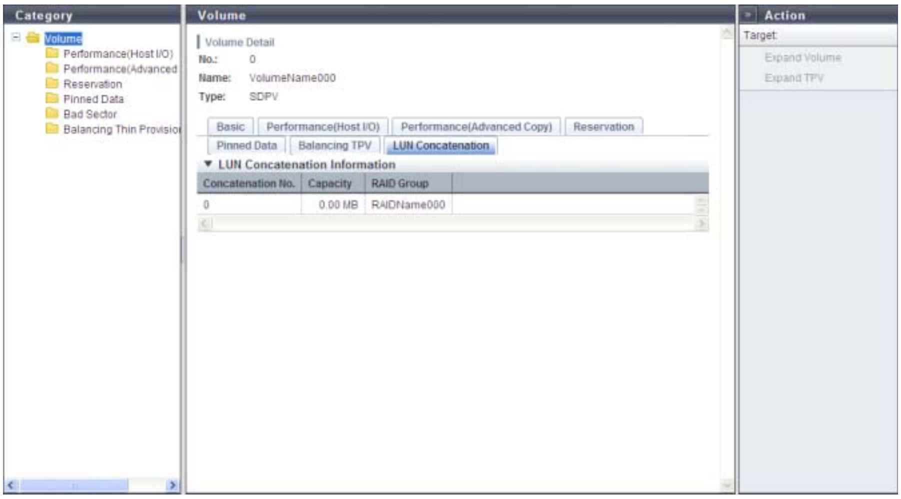


The following items are displayed in the Main area:

- No.
  The number of the RAID group that allocates the physical capacity to the target TPV is displayed.
- RAID Group
  The name of the RAID group that allocates the physical capacity to the target TPV is displayed.
- Used Capacity
  The capacity for each RAID group that allocates the physical capacity to the target TPV is displayed.
  This is the capacity that is available when balancing of the target TPV is started.
  Note that it is not the capacity after re-allocating the physical capacity in the relevant TPV to the RAID groups in the TPP.

5.1.13 Volume Detail (LUN Concatenation)

The detailed information of LUN Concatenation is displayed.

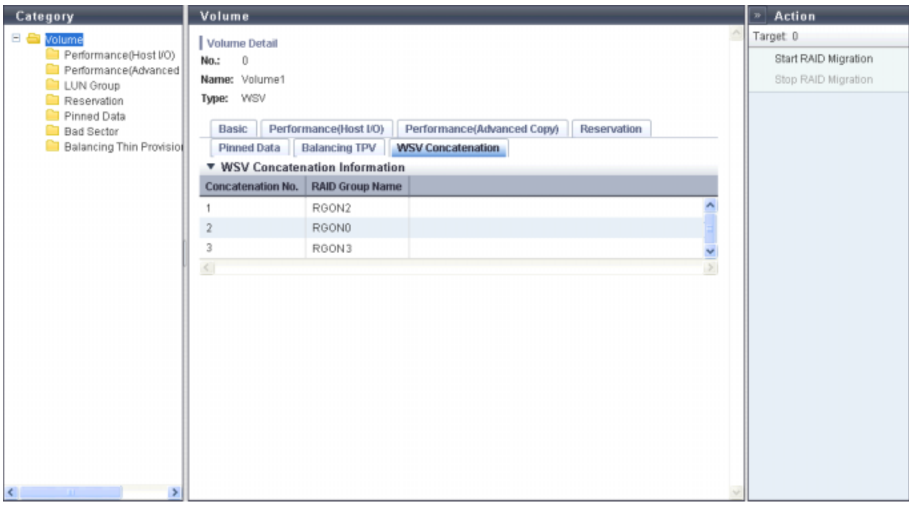


The following items are displayed in the Main area:

- Concatenation No.
  The concatenation number of the volume is displayed.
- Capacity
  The capacity of the volume that is concatenated to the target volume is displayed.
- RAID Group
  The RAID group name in which the volume that is concatenated to the target volume belongs is displayed.

5.1.14 Volume Detail (WSV Concatenation)

The detailed information of WSV Concatenation is displayed.



The following items are displayed in the Main area:

- Concatenation No.
  The concatenation number of the WSV (the order for allocating WSV Units to RAID groups) is displayed between 1 and 64.
- RAID Group Name
  The RAID group name to which the concatenated WSV Unit belongs is displayed.

5.2 Functions in the Action Area for Volume

When using functions in the Action area, select the desired function from the Action area that is displayed in the status display screen.
The functions in the Action area for Volume can be performed from the following display functions:

Functions in the Action area for Volume	Display function
Create Volume	• Volume (Basic Information)
Delete Volume	
Rename Volume	
Format Volume	
Expand Volume	
Expand Thin Provisioning Volume	
Start RAID Migration	
Stop RAID Migration	
Start Zero Reclamation	
Stop Zero Reclamation	
Delete Snap Data Pool Volume	
Force Delete Snap Data Pool Volume	
Modify Threshold Thin Provisioning Volume	
Initialize Snap Data Volume	
Encrypt Volume	
Forbid Advanced Copy	
Permit Advanced Copy	
Modify Cache Parameters	• Performance (Host I/O)
Export Cache Parameters	
Export Performance Information	
Release Reservation	• Reservation
Start Balancing Thin Provisioning Volume	• Balancing Thin Provisioning Volume
Stop Balancing Thin Provisioning Volume	

5.2.1 Create Volume

This function creates new volumes in the existing RAID group or Thin Provisioning Pool (TPP). Standard volumes, Wide Striping Volumes (WSV), Thin Provisioning Volumes (TPV), Snap Data Volumes (SDV), and Snap Data Pool Volumes (SDPV) can be created. Volumes are formatted automatically when they are created. Standard, WSV, TPV, and SDV can be accessed from the host when host affinity is set after volume creation. Note that SDPVs can be used after volume creation is complete and formatting is started.

Caution

- If a Thin Provisioning license is not registered, TPV cannot be created.
- If an Advanced Copy license is not registered, SDV and SDPV cannot be created. However, when using the ETERNUS DX80 S2/DX90 S2, a free license is registered by default and SDVs and SDPVs can be created.
- When encryption mode is disabled, volumes encrypted by CM cannot be created. Note that when SEDs are not installed in the ETERNUS DX Disk storage system, volumes encrypted by SEDs cannot be created.
- The following shows the maximum number of volumes that can be created for each model.
  - ETERNUS DX80 S2: 2048
  - ETERNUS DX90 S2: 4096
  - ETERNUS DX410 S2/DX440 S2: 16384
  - ETERNUS DX8100 S2: 16384
  - ETERNUS DX8700 S2: 65535
- The following shows the maximum capacity of TPV that can be created for each model.
  - ETERNUS DX80 S2/DX90 S2: 128TB
  - ETERNUS DX410 S2: 384TB
  - ETERNUS DX440 S2: 768TB
  - ETERNUS DX8100 S2: 768TB
  - ETERNUS DX8700 S2: 1024TB
- The following shows the conditions for creating SDPVs.
  - The volume capacity must be 2TB or less
  - The volume capacity must be a multiple of SDPE capacity (1GB/2GB/4GB).
- When creating an SDV, the capacity setting is not required. 24 (MB) + "Capacity of source volume (only SDV)" × 0.1% of the copy source volume capacity is automatically secured in the ETERNUS DX Disk storage system. "24MB" is the smallest volume capacity. "Capacity of source volume (only SDV)" × 0.1% is the capacity that is used for the controlling information area in the SDV. When using SnapOPC or SnapOPC+, make sure to create an SDV and SDPVs. An SDPV is a volume that configures an SDP. The SDP allocates free space when SDV capacity is insufficient.
- The maximum number of volumes that can be created is reduced in the following conditions:
  - When TPPs exist in the ETERNUS DX Disk storage system
  - When concatenated volumes exist in the ETERNUS DX Disk storage system
  - When REC Disk Buffers exist in the ETERNUS DX Disk storage system
  - When volumes undergoing RAID migration exist
  - When volumes undergoing balancing TPV exist
  - When "Enable" is selected for the Flexible Tier function mode
- The following restrictions apply to WSVs:
  - Volume capacity expansion is not available (LUN concatenation cannot be performed)
  - RAID group capacity expansion for RAID groups which configure WSVs is not available (LDE cannot be performed)

Note

- If an area with the necessary capacity cannot be acquired from the free space available, use the LUN Concatenation function to concatenate multiple space into a volume.
- Creating SDPVs in RAID groups with the same RAID type, drive type, number of drives is recommended.
- WSVs are volumes that are created by concatenating multiple RAID groups with striping. Use RAID migration to add or reduce the number of concatenated RAID groups. The RAID migration function can also be used to expand WSV capacity. Refer to "5.2.7 Start RAID Migration" (page 123) for details.
- This function cannot be used to create an ODX Buffer volume. Refer to "8.2.10 Create ODX Buffer Volume" (page 311) for details.
- When manually selecting drives to create a volume (*1), the volume number can be specified. Note that volumes have to be created one at a time. Multiple volumes cannot be created when specifying the volume number for a new volume. When "Automatic" is selected to create a volume or when "Manual" is selected but a volume number is not specified, the volume number is allocated when a volume is created from the smallest unused decimal number in ascending order.

*1: Select "Manual" to create WSVs or to create TPVs, SDVs, SDPVs, or Standard type volumes by specifying the drives manually. Refer to "When creating Standard, TPV, SDV, or SDPV type volumes" (page 97) or "When creating WSV type volumes" (page 105) for details.

- When "Manual" is selected, the specified number of volumes by using the maximum free space that is available in the RAID group can be created. Inputting the volume capacity is not required. "Standard", "WSV", and "SDPV" type volumes can be created using the maximum free space.

When creating Standard, TPV, SDV, or SDPV type volumes

There are two methods to create a volume: automatic drive selection and manual drive selection.

When selecting "Automatic"

The procedure to create a volume by selecting drives automatically is as follows:

Procedure

1. Click [Create] in [Action].
2. Select "Automatic" for "RAID Group/TPP Selection".
3. Specify the volume detailed information, and click the [Create] button.
   - Name
     Specify the volume name. An existing volume name cannot be specified. When creating multiple volumes at the same time, the new volumes are named automatically. Refer to "Naming conventions for creating volumes" (page 993) for details.
     The following input condition applies:
     - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")

- Capacity
  Specify the volume capacity and select the unit of capacity.
  Up to a 15-digit number including the "." (decimal point) can be input. Note that when "MB" is selected, the specified value is rounded down to the nearest whole number. When "GB" or "TB" is selected, the specified value is converted to "MB" and rounded down to the nearest whole number.
  The following input conditions apply:
  - When creating Standard volumes or TPVs: 24MB - 128TB (numeric characters)
  - When creating SDPVs: 1GB - 2TB (numeric characters)
  - MB/GB/TB

Note

Up to 15 numbers can be used. If a decimal point is included in the input value, up to 14 numbers can be used.
[Example] 0.1234567890123 (14 numbers and a decimal point)

Caution

- When creating an SDV, the capacity setting is not required. 24 (MB) + "Capacity of source volume (only SDV)" × 0.1% of the copy source volume capacity is automatically secured in the ETERNUS DX Disk storage system. When using SnapOPC or SnapOPC+, make sure to create an SDV and SDPVs.
- When creating multiple volumes in a RAID group, the maximum number of volumes that can be created for the user capacity may be reduced. To use the entire user capacity, the volume size must be an exact multiple of the basic size (stripe size). Refer to "E.1 Basic Size for each RAID Group" (page 995) for details.

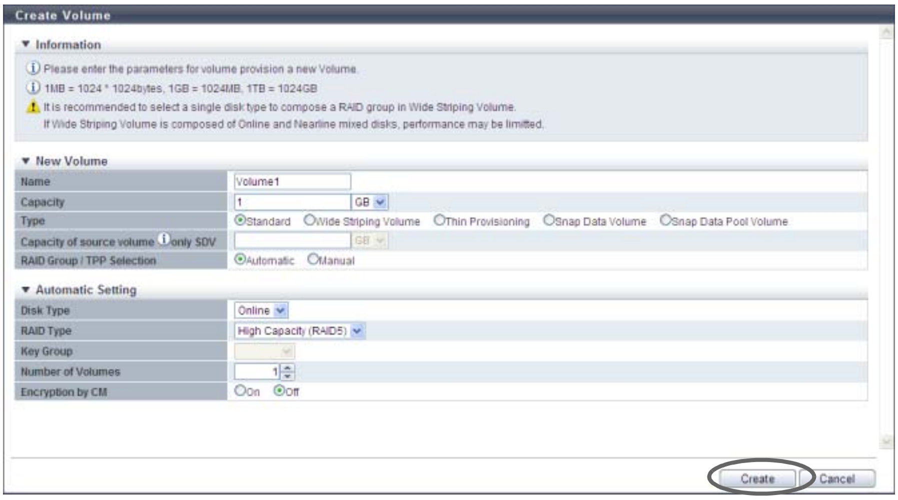
- Type
  Specify the volume type. When the [Create Volume] function is selected from the RAID group list, "Standard", "Snap Data Volume", or "Snap Data Pool Volume" is displayed.
  When the [Create Volume] function is selected from the Thin Provisioning Pool list, only "Thin Provisioning" is displayed.
  - Standard
    Normal volumes that are created in the RAID group.
  - Thin Provisioning
    Volumes that are created in Thin Provisioning Pools.
  - Snap Data Volume
    Copy destination volumes for SnapOPC or SnapOPC+.
  - Snap Data Pool Volume
    Volumes that are used as expansion areas for SDV.
- Capacity of source volume (only SDV)
  Specify the copy source volume capacity and select the unit of capacity. This item can only be specified when "Snap Data Volume" is selected for "Type".
  The following input conditions apply:
  - 24MB - 128TB
  - MB/GB/TB

- Disk Type
  Specify the drive type.
  - Online
  - Nearline
  - SSD
  - SED
- RAID Type
  Select the RAID type. The specified volume type and disk type determine the selectable RAID types that are displayed as options.
  - High Performance (RAID1+0)
  - High Capacity (RAID5)
  - High Reliability (RAID6)
  - Reliability (RAID5+0)
  - Mirroring (RAID1)
  - Striping (RAID0)
- Key Group
  When creating volumes in a RAID group that is registered in the key group (*1), select "Enable".
  When creating volumes in a RAID group that is not registered in the key group, select "Disable".
  This item is available only when "Disk Type" is "SED". Only the available setting (Enable or Disable) is displayed as an option. When the "Disk Type" is not "SED", the field is blank.
  *1: The key group combines all of the RAID groups that use the same SED authentication key.
- Number of Volumes
  Specify the number of volumes to be created in decimal number.

Caution

When using the ETERNUS DX8700 S2, up to 1024 volumes can be created at once.

- Encryption by CM
  Select whether to encrypt (On) or not encrypt (Off) the new volumes. When the encryption mode is disabled, "On" cannot be selected. When "Disk Type" is "SED", "On" cannot be selected.
  - When the "Disk Type" is "SED":
    Volumes are created in the RAID group or the TPP configured by SEDs.
  - When the "Disk Type" is not "SED":
    - When "On" is selected:
      Volumes that are encrypted by CM are created. When creating a TPV, the volume is created in the TPP that is encrypted by CM.
    - When "Off" is selected:
      Volumes that are not encrypted are created. When creating a TPV, the volume is created in the TPP that is not encrypted.



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When a name is not input for "Name"
- When the "Name" overlaps with an existing volume name
- When the "Name" does not satisfy the input conditions
- When the capacity is not specified for "Capacity"
- When the capacity that is specified for "Capacity" exceeds the maximum capacity that can be created
- When the SDPV capacity that is specified for "Capacity" is not a multiple of the SDPE capacity (1GB/2GB/4GB)
- When the number of volumes that is specified for "Number of Volumes" exceeds the maximum number of volumes that can be created
- When free space in the RAID group or TPP is insufficient

4 Click the [OK] button.



→ Volume creation starts.

5 Click the [Done] button to return to the [Volume] screen.

End of procedure

Manually selecting drives to create volumes

The procedure to create a volume by selecting drives manually is as follows:

Procedure

1 Click [Create] in [Action].

2 Select "Manual" for "RAID Group/TPP Selection".

3 Specify the detailed information of new volumes and select the RAID group or TPP in which the volumes are to be created. Click the [Create] button.

- Name
  Specify the volume name. An existing volume name cannot be specified. When creating multiple volumes at the same time, the new volumes are named automatically. Refer to "Naming conventions for creating volumes" (page 993) for details.
  The following input condition applies:
  - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")
- Capacity
  Specify the volume capacity and select the unit of capacity.
  Up to a 15-digit number including the "." (decimal point) can be input. Note that when "MB" is selected, the specified value is rounded down to the nearest whole number. When "GB" or "TB" is selected, the specified value is converted to "MB" and rounded down to the nearest whole number.
  The following input conditions apply:
  - When creating Standard volumes or TPVs: 24MB - 128TB (numeric characters)
  - When creating SDPVs: 1GB - 2TB (numeric characters)
  - MB/GB/TB

Note

Up to 15 numbers can be used. If a decimal point is included in the input value, up to 14 numbers can be used.
[Example] 0.1234567890123 (14 numbers and a decimal point)

Caution

- If "Use all Largest Free Space" is selected when creating volumes manually, inputting the capacity is not required. The specified value and unit are not used.
- When creating an SDV, the capacity setting is not required. 24 (MB) + "Capacity of source volume (only SDV)" × 0.1% of the copy source volume capacity is automatically secured in the ETERNUS DX Disk storage system. When using SnapOPC or SnapOPC+, make sure to create an SDV and SDPVs.
- When creating multiple volumes in a RAID group, the maximum number of volumes that can be created for the user capacity may be reduced. To use the entire user capacity, the volume size must be an exact multiple of the basic size (stripe size). Refer to "E.1 Basic Size for each RAID Group" (page 995) for details.

- Type
  Specify the volume type. When the [Create Volume] function is selected from the RAID group list, "Standard", "Snap Data Volume", or "Snap Data Pool Volume" is displayed.
  When the [Create Volume] function is selected from the Thin Provisioning Pool list, only "Thin Provisioning" is displayed.
  - Standard
    Normal volumes that are created in the RAID group.
  - Thin Provisioning
    Volumes that are created in Thin Provisioning Pools.
  - Snap Data Volume
    Copy destination volumes for SnapOPC or SnapOPC+.
  - Snap Data Pool Volume
    Volumes that are used as expansion areas for SDV.
- Capacity of source volume (only SDV)
  Specify the copy source volume capacity and select the unit of capacity. This item can only be specified when "Snap Data Volume" is selected for "Type".
  The following input conditions apply:
  - 24MB - 128TB
  - MB/GB/TB
- Use all Largest Free Space
  Select the "Enable" checkbox to create the specified number of volumes with the largest available free space in the RAID group. This checkbox can be selected or cleared only when "Type" is "Standard" or "SDPV".
  If "Enable" is selected, the specified number of volumes in the "Number of Volumes" field are created in the free space that is displayed as "Largest Free Space" for each RAID group. If "Type" is "Standard", capacity is allocated almost evenly for the basic size (stripe size) of the RAID group. If "Type" is "SDPV", a multiple of the SDPE capacity is allocated almost evenly for the basic size (stripe size) of the RAID group.

Caution

- When "Enable" is selected, the capacity and the unit that are specified for "New Volume" are not available.
- The capacity for created volumes is not displayed. Use the [Volume] screen to check the volume capacity after volume creation is complete.

- Volume No.
  When specifying the volume number for a new volume, select the "Set Value" checkbox and input the volume number.
  The following input condition applies:
  - Numeric characters (decimal)
  - The following volume numbers can be used for each model:
    - ETERNUS DX80 S2: 0 - 2047
    - ETERNUS DX90 S2: 0 - 4095
    - ETERNUS DX410 S2/DX440 S2: 0 - 16383
    - ETERNUS DX8100 S2: 0 - 16383
    - ETERNUS DX8700 S2: 0 - 65534

Caution

An existing volume number cannot be specified.

- Encryption by CM
  Select whether to encrypt (On) or not encrypt (Off) the new volumes. When the encryption mode is disabled, "On" cannot be selected.

Caution

When creating a volume (when specifying "1" or more for "Number of Volumes") in the RAID group for which "Disk Type" is "SED", select "Off" for this item.

- Number of Volumes (When creating volumes other than "TPV")
  Specify the number of volumes that is to be created in each RAID group between "1" and "128".
  Click the [Recalculation of Max Count] button to display the maximum number of volumes that can be created in each RAID group with the specified capacity. When the volume capacity is not specified (including when "Use all Largest Free Space" is selected), the maximum number of volumes that can be created for each RAID group is displayed. When "Encryption by CM" is "On", volumes cannot be created in the RAID groups for which "Disk Type" is "SED".

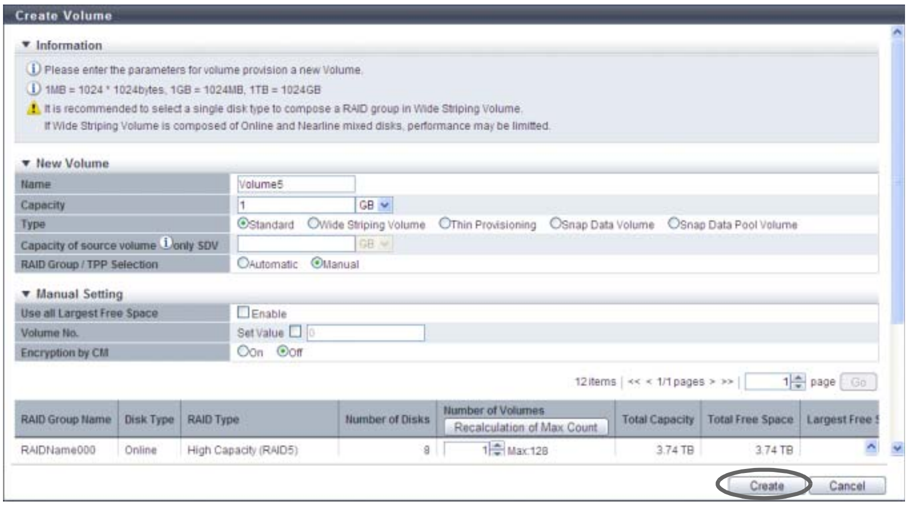
Caution

When volume numbers are manually specified, only one volume can be created at a time. Input "1" for "Number of Volumes".

- Number of Volumes (When creating "TPV")
  Specify the number of volumes that is to be created in each TPP between "1" and "16384".

Caution

- When using the ETERNUS DX8700 S2, up to 1024 volumes can be created at a time.
- When volume numbers are manually specified, only one volume can be created at a time. Input "1" for "Number of Volumes".



→ A confirmation screen appears.

Note

- When specifying the volume number, select the "Set Value" checkbox and input the volume number.
- When using the maximum free space in the RAID group to create volumes without specifying the capacity, select the "Enable" checkbox for "Use all Largest Free Space", and then input the number of volumes. This setting is available for "Standard" and "SDPV" type volumes.

Caution

- When creating a "TPV", the "Encryption by CM" setting cannot be changed.
- An error screen appears in the following conditions:
  - When a name is not input for "Name"
  - When the "Name" overlaps with an existing volume name
  - When the "Name" does not satisfy the input conditions
  - When the "Enable" checkbox for "Use all Largest Free Space" is cleared and "Capacity" is not input
  - When the capacity that is specified for "Capacity" exceeds the maximum capacity that can be created
  - When the SDPV capacity that is specified for "Capacity" is not a multiple of the SDPE capacity (1GB/2GB/4GB)
  - When the "Enable" checkbox for "Use all Largest Free Space" is selected and the capacity of a created volume is 23MB or less
  - When the "Enable" checkbox for "Use all Largest Free Space" is selected and the capacity of a created volume exceeds the maximum capacity
  - When the "Set Value" checkbox is selected and "Volume No." is not input
  - When the input value of "Volume No." exceeds the settable range
  - When the specified "Volume No." is already used
  - When "Volume No." is specified and total number of values that are specified to "Number of Volumes" is not "1"
  - When the number of volumes that is specified for "Number of Volumes" exceeds the maximum number of volumes that can be created
  - When free space in the RAID group or TPP is insufficient
  - When LDE is being performed in the RAID group

4 Click the [OK] button.



→ Volume creation starts.

5 Click the [Done] button to return to the [Volume] screen.

End of procedure

When creating WSV type volumes

WSVs are created by concatenating volumes that are the same size in multiple RAID groups. Input the volume information for WSVs and the selection information for RAID groups, and specify the RAID groups that are to be concatenated.

Caution

- The conditions for RAID groups to configure WSVs are as follows:
  - The RAID type must be the same
  - The number of member drives in the RAID group must be the same
  - The Stripe Depth value must be the same
  - The disk type (Online/Nearline/SSD/SED) must be the same
    (since the access performance of WSVs is reduced, do not select "Online/Nearline").
  - The disk speed must be the same
    (RAID groups configured with different speed drives can be selected. Note that this reduces the access performance for WSVs. It is recommended to select the same speed disks. The speed of the drives that configure a RAID group can be checked in the [RAID Group Detail] screen ([Disk] tab).)
  - The key group setting is the same as the existing RAID groups
    (When "Disk Type" is "SED", RAID groups with the key group setting enabled or disabled can be selected. Selecting the same key group setting status is recommended. Not doing so reduces the access performance for WSVs. The key group setting status can be checked with the "Encryption" field in the [Select RAID Groups] screen.)
  - The sequential unused area must be the same size or bigger than the capacity of the volumes that are to be concatenated
- The number of concatenated RAID groups is from 2 to 64.
- The WSV capacity is from 24MB to 128TB.

The procedure to create WSV type volumes is as follows:

Procedure

1 Click [Create] in [Action].

2 Input the detailed information of the volumes that are to be created, specify the selection information of the RAID group, and then click the [Select RAID Groups] button.

New Volume

- Name
  Specify the volume name. An existing volume name cannot be specified. When creating multiple volumes at the same time, the new volumes are named automatically. Refer to "Naming conventions for creating volumes" (page 993) for details.
  The following input condition applies:
  - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")

- Capacity
  Specify the volume capacity and select the unit of capacity.
  Up to a 15-digit number including the "." (decimal point) can be input. Note that when "MB" is selected, the specified value is rounded down to the nearest whole number. When "GB" or "TB" is selected, the specified value is converted to "MB" and rounded down to the nearest whole number.
  The following input conditions apply:
  - 24MB - 128TB (numeric characters)
  - MB/GB/TB

Note

Up to 15 numbers can be used. If a decimal point is included in the input value, up to 14 numbers can be used.
[Example] 0.1234567890123 (14 numbers and a decimal point)

Caution

When creating multiple volumes in a RAID group, the maximum number of volumes that can be created for the user capacity may be reduced. To use the entire user capacity, the volume size must be an exact multiple of the basic size (stripe size). Refer to "E.1 Basic Size for each RAID Group" (page 995) for details.

- Type
  Select "Wide Striping Volume".
  - Wide Striping Volume
    Volumes that are configured by multiple RAID groups that are concatenated with striping to improve performance.
- RAID Group/TPP Selection
  "Manual" is selected.

Caution

When "Wide Striping Volume" is specified for "Type", "Manual" is selected automatically. Note that "Automatic" cannot be selected.

Volume Information

- Use all Largest Free Space
  Select the "Enable" checkbox to create the specified number of WSVs with the largest available free space in the selected RAID group.
  WSVs are created by concatenating spaces with the same capacity in multiple RAID groups. If "Enable" is selected, the specified number of WSVs in the "Number of Volumes" field are created using the smallest "Largest Free Space" value in the concatenated RAID groups.

Caution

- When "Enable" is selected, the capacity and the unit that are specified for "New Volume" are not available.
- The capacity for created WSVs is not displayed. Use the [Volume] screen to check the volume capacity after volume creation is complete.

- Number of Volumes
  The number of volumes that are to be created is displayed. Note that "1" is displayed when "Manual" is selected for "Concatenation Order".

Caution

When volume numbers are manually specified, only one volume can be created at a time. Input "1" for "Number of Volumes".

- Volume No.
  When specifying the volume number for a new volume, select the "Set Value" checkbox and input the volume number.
  The following input condition applies:
  - Numeric characters (decimal)
  - The following volume numbers can be used for each model:
    - ETERNUS DX80 S2: 0 - 2047
    - ETERNUS DX90 S2: 0 - 4095
    - ETERNUS DX410 S2/DX440 S2: 0 - 16383
    - ETERNUS DX8100 S2: 0 - 16383
    - ETERNUS DX8700 S2: 0 - 65534

Caution

An existing volume number cannot be specified.

- Wide Stripe Size
  Select the Wide Stripe Size ("Normal" or "Small") for the volumes.
  "Wide Stripe Size" is the size of the WSV Unit that is allocated to each RAID group in series. It is not necessary to change the default setting (Normal) for normal use.
  - Normal
    An integral multiple of the basic size for each RAID type (*1). The maximum size is 16MB or smaller.
    The actual size varies according to the RAID group type, the number of member disks, and Stripe Depth.
    Select "Normal" to improve random write access performance.
  - Small
    An integral multiple of the basic size for each RAID type. The maximum size is 2MB or smaller.
    The actual size varies according to the RAID group type, the number of member disks, and Stripe Depth.
    Note that because the segment size of the volume is small and many host accesses among multiple RAID groups occur, the performance may be reduced according to the amount of host I/O.

    *1: The basic size (stripe size) when creating a volume. Refer to "E.1 Basic Size for each RAID Group" (page 995) for details.

Caution

- If the basic size of the RAID group is 2MB or more, the basic size is specified for Wide Stripe Size even when "Small" is selected.
- This function cannot be used to change the "Wide Stripe Size" setting after WSVs are created. To change the "Wide Stripe Size" value, use the [RAID Migration] function. Refer to "5.2.7 Start RAID Migration" (page 123) for details.

- Concatenation Order
  Select the concatenation order of RAID groups from "Automatic" or "Manual". It is not necessary to change the default setting (Automatic) for normal use.
  - Automatic
    Automatically specify the concatenation order of RAID groups.
    If multiple WSVs are already registered, the next available RAID group that enables the controlling CM allocation to be distributed evenly is selected as 1 for the concatenation order. If multiple RAID groups satisfy this condition, the RAID group with the smallest RAID group number is selected as 1 in the concatenation order. RAID groups are concatenated starting from 1 (first) in ascending order. The last RAID group is concatenated to the first RAID group.
    Volumes that belong to a RAID group for which the concatenation order is 1 (first) are called "representative volumes".
  - Manual
    Manually specify the concatenation order of the RAID group.
- Encryption by CM
  Select whether to encrypt (On) or not encrypt (Off) the new volumes. When the encryption mode is disabled, "On" cannot be selected.

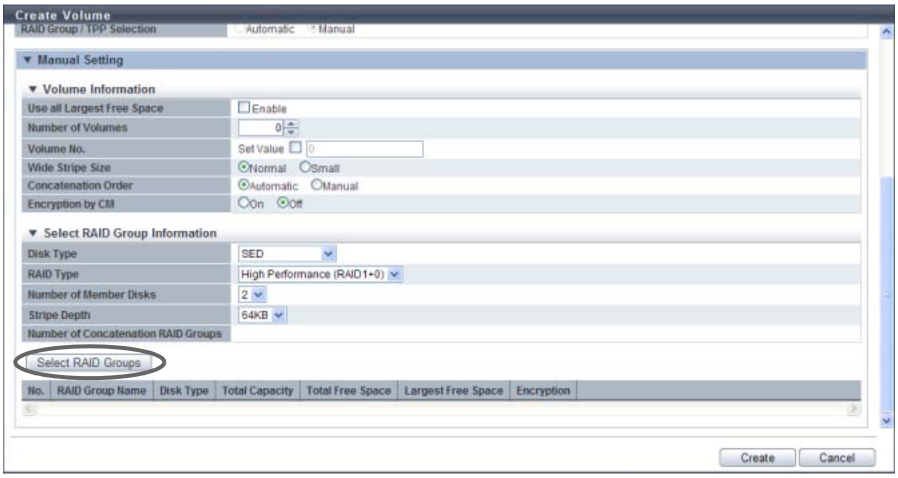
Caution

When specifying "SED" for "Disk Type", select "Off" for "Encryption by CM".

Select RAID Group Information

- Disk Type
  Specify the drive type.
  The installed drive determine the selectable disk types that are displayed.
  If there are no RAID groups in which volumes can be created, the field is blank.
  - Online
  - Nearline
  - SSD
  - SED
  - Online/Nearline
  - Blank

- RAID Type
  Select the RAID type.
  If there are no RAID groups in which volumes can be created, the field is blank.
  - High Performance (RAID1+0)
  - High Capacity (RAID5)
  - High Reliability (RAID6)
  - Reliability (RAID5+0)
  - Mirroring (RAID1)
  - Striping (RAID0)
- Number of Member Disks
  Select the number of member disks in the RAID group.
  The selectable number of member disks, which is determined by the specified RAID type, is displayed.
  If there are no RAID groups in which volumes can be created, the field is blank.
  - High Performance (RAID1+0)
    4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32
  - High Capacity (RAID5)
    3 - 16
  - High Reliability (RAID6)
    5 - 16
  - Reliability (RAID5+0)
    6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32
  - Mirroring (RAID1)
    2
  - Striping (RAID0)
    2 - 16
- Stripe Depth
  Select the Stripe Depth of the RAID group.
  The selectable Stripe Depth varies depending on the specified RAID type. Refer to "Available Stripe Depth value" (page 180) for details.
  If "Mirroring (RAID1)" is selected as the RAID type, a "-" (hyphen) is displayed.
  If there are no RAID groups in which volumes can be created, the field is blank.
  - 64 KB
  - 128 KB
  - 256 KB
  - 512 KB
  - 1024 KB



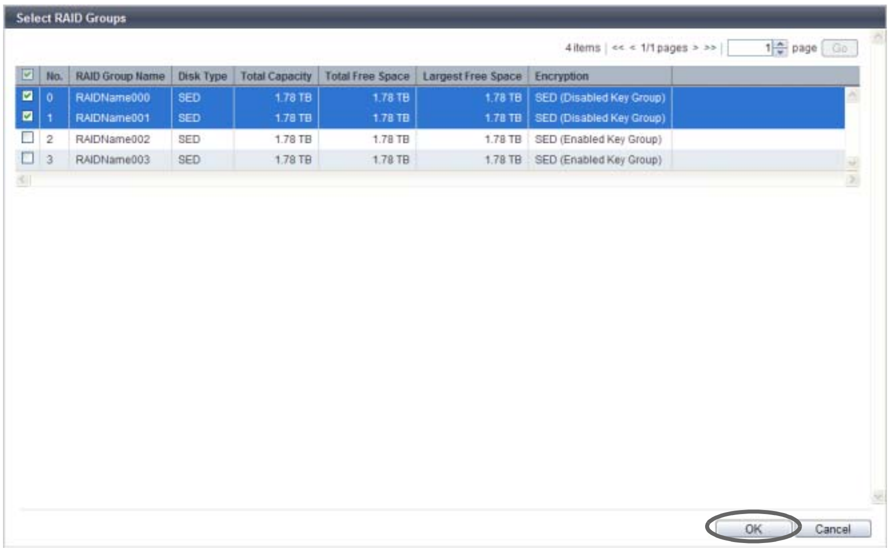
→ The [Select RAID Groups] screen appears.

Note

- When specifying the volume number, select the "Set Value" checkbox and input the volume number.
- When using the maximum free space in the selected RAID group to create WSVs without specifying the capacity, select the "Enable" checkbox for "Use all Largest Free Space", and then input the number of WSVs.

3 Select the RAID group that is to be concatenated (multiple selections can be made) and click the [OK] button.

- Checkbox to select RAID groups
  Select the checkbox for the RAID group to be selected.

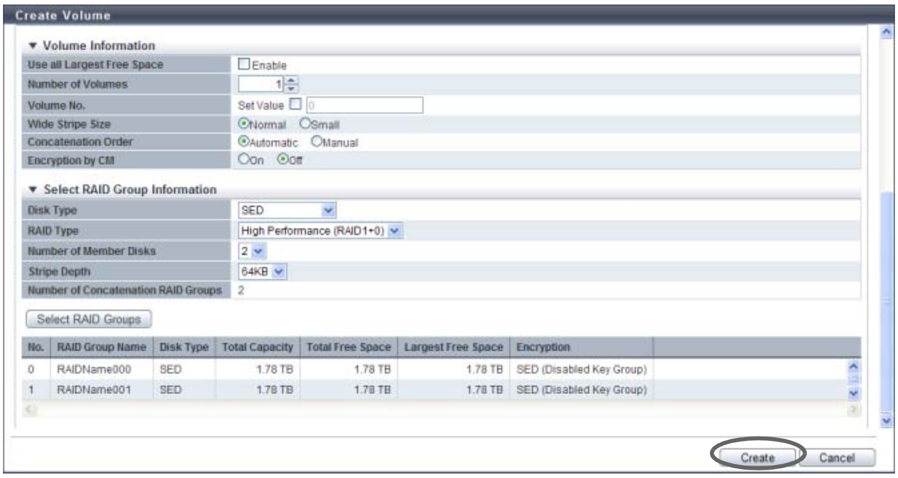


→ The display returns to the initial screen.

Caution

When "Disk Type" is "SED", setting the same "Encryption" settings (the setting status of the key group) is recommended for all of the RAID groups that configure the WSV.

4 After selecting RAID groups is complete, click the [Create] button.



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When the "Name" is not input
- When the name overlaps with an existing volume name for "Name"
- When the "Name" does not satisfy the input conditions
- When the "Enable" checkbox for "Use all Largest Free Space" is cleared and "Capacity" is not input
- When the capacity that is specified for "Capacity" exceeds the maximum capacity that can be created
- When the "Enable" checkbox for "Use all Largest Free Space" is selected and the capacity of a created WSV is 23MB or less
- When the "Enable" checkbox for "Use all Largest Free Space" is selected and the capacity of a created WSV exceeds the maximum capacity
- When the "Set Value" checkbox is selected and "Volume No." is not input
- When the input value of "Volume No." exceeds the settable range
- When the specified "Volume No." is already used
- When "Volume No." is specified and "Number of Volumes" is not "1"
- When the "Number of Concatenation RAID Groups" field is left blank, "1" is specified, or a value that is "65" or more is specified
- When the maximum free space in the selected RAID group is smaller than the volume size that is to be concatenated
- When LDE is being performed in the RAID group

Note

To change the concatenation order of the RAID groups, select "Manual" for "Concatenation Order" in the Volume Information field. Click the [Concatenation Order] link to display the [Setting Concatenation Order] screen. The concatenation order of the RAID groups can be changed in the [Setting Concatenation Order] screen.

5 Click the [OK] button.



→ Volume creation starts.

6 Click the [Done] button to return to the [Volume] screen.

End of procedure

5.2.2 Delete Volume

This function deletes volumes.
Standard volumes, WSVs, TPVs, and SDVs can be deleted.

Caution

- When a volume is deleted, access to data in the target volume is not allowed.
- The following volumes cannot be deleted:
  - Volumes that are registered in a LUN group
  - Volumes that are mapped with applications other than GUI
  - Volumes undergoing RAID migration
  - A copy source volume or a copy destination volume of the Advanced Copy that is being executed
  - Volumes undergoing TPV balancing (work volumes and target TPVs for balancing)
  - Volumes undergoing FTRP balancing (work volumes)
  - Volumes with a Storage Migration path
  - An ODX Buffer volume for which Advanced Copy (ODX) is being performed
- By repeating creation and deletion of volumes, free space may be dispersed in the RAID group.
- Up to 128 volumes can be deleted at once.

Note

- When deleting SDPVs, refer to "5.2.11 Delete Snap Data Pool Volume" (page 141) or "5.2.12 Force Delete Snap Data Pool Volume" (page 142).
- This function can be used to delete an ODX Buffer volume.
- When volumes are registered in LUN groups, or a message "The specified volumes have already been mapped. They cannot be deleted." is displayed, use the following procedure to delete the volumes from LUN groups.

  (1) Check all the LUN groups in which volumes are registered in the [LUN Group] screen under the [Volume] navigation.

  (2) Select a LUN group in which the volume is registered in the [LUN Group] screen under the [Connectivity] navigation, and then click [Modify LUN Group] in [Action].

  (3) Delete "allocation information of host LUN and volume number" in the [Modify LUN Group] screen.

  (4) When a volume is registered in multiple LUN groups, repeat Step (2) and Step (3).
  (LUN groups in which a volume is registered can be checked with the [LUN Group] field in the [Modify LUN Group] screen in Step (3).)

  (5) If the location information of the port (CM#x CA#y Port#z) is displayed in the [LUN Group] field in Step (1) or Step (3), the volume is mapped with applications other than GUI. Use the relevant application to delete the volume from the port mapping information.

  (6) Confirm that "LUN Group Count" is "0" in the [LUN Group] field under the [Volume] navigation.

  (7) Use this function to delete volumes.

  It is not necessary to delete a host affinity when deleting volumes with the host affinity setting from a LUN group. If all of the volumes in a LUN group are not needed, delete the host affinity, and then click the [Delete LUN Group] button to delete the LUN group with volumes in Step (2).

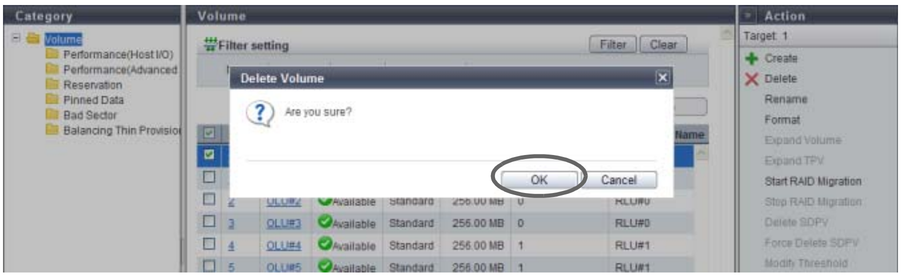
The procedure to delete a volume is as follows:

Procedure

1 Select the volume to be deleted (multiple selections can be made) and click [Delete] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ Deletion of a volume starts.

Note

When a TPV is deleted, the physical allocating capacity of the relevant TPV is formatted. The physical allocating capacity is released after formatting is complete.

3 Click the [Done] button to return to the [Volume] screen.

End of procedure

5.2.3 Rename Volume

This function changes the volume name.

Caution

When using the ETERNUS DX8700 S2, up to 1024 volumes can be renamed at once.

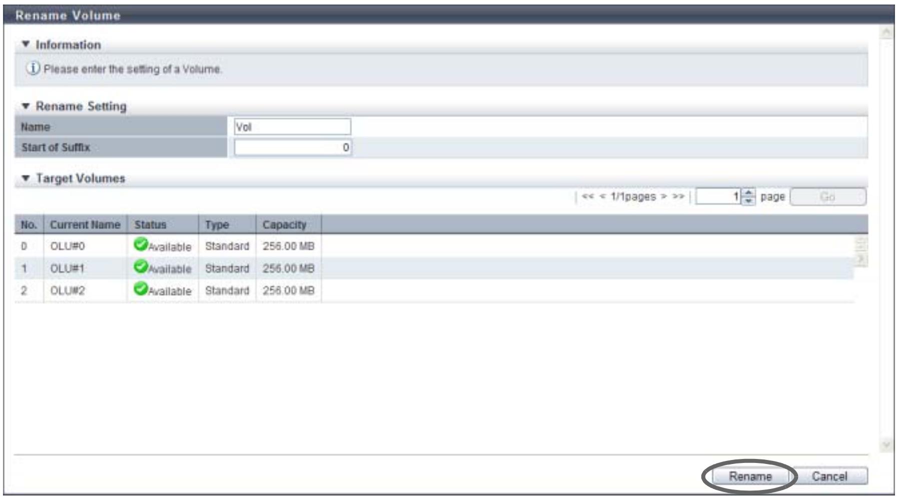
The procedure to rename a volume is as follows:

Procedure

1 Select the volume to be renamed (multiple selections can be made) and click [Rename] in [Action].

2 Input the new volume "Name" and the "Start of Suffix" (only when multiple volumes are selected), and click the [Rename] button.

- Name
  Input a new volume name.
  The following input condition applies:
  - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")
- Start of Suffix
  Input the starting number of the suffix that is to be added to the new volume name. When changing multiple volume names, the suffix number is added to the volume names with consecutive numbers in ascending order starting with the entered number. Refer to "Naming conventions for renaming volumes" (page 993) for details. When changing only one volume name, the "Start of Suffix" field is not displayed.
  The following input conditions apply:
  - Numeric characters ("0" - "99999")
  - Decimal number
  - 1 - 5 digits



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When the volume name is not input
- When the "Name" does not satisfy the input conditions
- When the "Name" overlaps with an existing volume name (when selecting a single volume)
- When the "Start of Suffix" is not input (when selecting multiple volumes)
- When the "Start of Suffix" does not satisfy the input conditions (when selecting multiple volumes)

3 Click the [OK] button.



→ Renaming of the volume starts.

4 Click the [Done] button to return to the [Volume] screen.

End of procedure

5.2.4 Format Volume

This function formats the selected volume.
The data stored in the volume will be deleted by formatting.

Caution

- Formatting newly created volumes is not required since these volumes are formatted automatically.
- This function formats "Standard", "WSV", "SDV", "SDPV", "TPV", and "FTV" type volumes.
- When formatting a TPV, the physical allocating area that is used by the target TPV is released.
- This function cannot be used under the following conditions:
  - When a RAID group diagnosis is being performed in the ETERNUS DX Disk storage system
  - When a disk diagnosis is being performed in the ETERNUS DX Disk storage system
  - When pinned data exists in the ETERNUS DX Disk storage system
- The following volumes cannot be formatted:
  - Volumes for which "Status" is " Broken", " Data Lost", or " Not Ready"
  - Volumes undergoing RAID migration
  - A copy source volume or a copy destination volume of an Advanced Copy (local/remote) that is being performed
  - Volumes registered in a RAID group undergoing Logical Device Expansion (LDE)
  - An ODX Buffer volume for which Advanced Copy (ODX) is being performed in the ETERNUS DX Disk storage system
- Do not format the volumes with Storage Migration paths.
- When using the ETERNUS DX8700 S2, up to 1024 volumes can be formatted at a single operation.

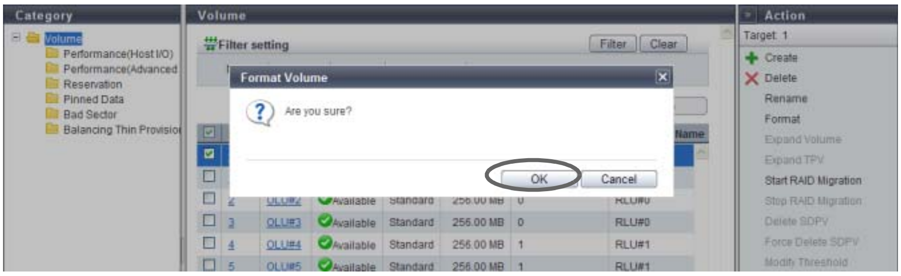
The procedure to format a volume is as follows:

Procedure

1 Select the volume to be formatted (multiple selections can be made) and click [Format] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ Formatting of a volume starts.

3 Click the [Done] button to return to the [Volume] screen.

End of procedure

5.2.5 Expand Volume

This function concatenates a new volume to the selected volume by using the LUN Concatenation function to expand the volume capacity that can be used from the server.
Volume expansion provides the following features:

- Volume capacity can be expanded by using the free space in an existing RAID group.
- Free space that is 1GB or more can be concatenated.
- A volume with a maximum capacity of 128TB can be created. (The maximum capacity of ODX Buffer volume is 1TB.)
- Concatenation can be performed among multiple RAID groups.
- Any RAID type can be applied for a concatenation source volume and a concatenation destination volume. Concatenation can be performed regardless of the RAID type for the concatenation source volume and the concatenation destination volume.
- Data can be accessed from the host in the same way regardless of the concatenation status (before, during, or after concatenation).
- When the number of volumes in a concatenated volume is 15 or less, volumes can be added to the existing concatenated volume.

Requirements for concatenating a volume

- The "Type" is "Standard"
- The "Status" is not " Broken", " Data Lost", " Not Ready", or " Readying"
- The volume capacity is 1GB or larger
- When the concatenation source volume is a concatenated volume, the volume must satisfy the following requirements:
  - The number of volumes in the concatenated volume must be 15 or less
  - The capacity of the concatenated volume must be less than 128TB
    (If the concatenated volume is configured with an ODX Buffer volume, the volume must be less than 1TB)
- RAID migration is not being performed (the target volume is not used as a migration source or a migration destination)
- There are no Advanced Copy sessions (local or remote) for which the copy range is "Totally" (*1)
- LDE is not being performed for the RAID group to which the target volume belongs
- Encryption is not being performed for the target volume
- A Storage Migration path is not created in the target volume
- The "Cache Page Capacity" must not be limited (*2)

*1: "Totally" is specified for the copy range in the following conditions:

- When performing a LUN to LUN copy session with the ETERNUS SF AdvancedCopyManager Copy Control Module (CCM)
- When performing a copy session with ETERNUS SF AdvancedCopyManager Adapter for VMware Site Recovery Manager
- When performing a copy session with ETERNUS VSS Hardware Provider
- When performing a SnapOPC+ session that is specified with GUI or CLI

*2: A "-" (hyphen) is specified for "Cache Page Capacity" by using the procedure in "5.2.18 Modify Cache Parameters" (page 148). Note that "-" (hyphen) is the default value.

Requirements to obtain free space from RAID groups

- The "Status" is not " Broken"
- The RAID group must satisfy the following requirements:
  - The RAID group must contain Standard type volumes, WSVs, SDVs, or SDPVs
    If this is not the case, the RAID group must not contain any volumes
  - The RAID group must not belong to a TPP
  - The RAID group must not belong to an FTRP
  - The RAID group must not be registered as an REC Disk Buffer
- The number of volumes registered in the target RAID group is 127 or less
- The free space for the RAID group is 1GB or larger
- The RAID group must not be blocked
- LDE is not being performed in the target RAID group
- When the disk type of the RAID group to which the concatenation source volume belongs is "SSD", the concatenation destination RAID group must be configured with "SSD"
- When the disk type of the RAID group to which the concatenation source volume belongs is "SED", the concatenation destination RAID group must be configured with "SED"

Caution

- Backing up the data before performing volume expansion is recommended.
- This function cannot be used under the following conditions:
  - When the maximum number of volumes is already registered in the ETERNUS DX Disk storage system
  - When switching firmware in hot mode in the ETERNUS DX Disk storage system
  - When a RAID group diagnosis or a disk diagnosis is being performed in the ETERNUS DX Disk storage system
- Expanded volume capacity must be recognized by server.

Note

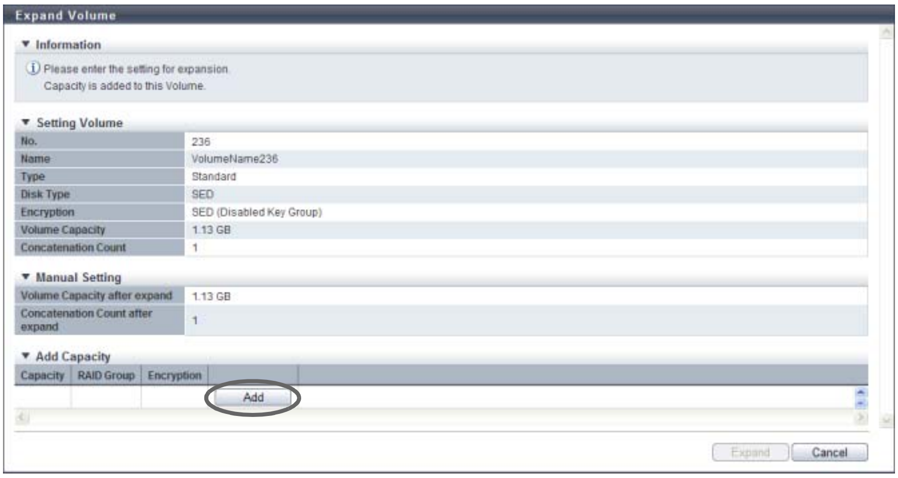
- The same RAID type and drive speed is recommended for the RAID group to which the concatenation volume belongs and the RAID group after concatenation.
- The encryption status of volumes after concatenation is the same as the concatenation source volume.
- Concatenated volumes are formatted automatically. Refer to the [Volumes] screen for format progress.
- To expand the TPV capacity, refer to "5.2.6 Expand Thin Provisioning Volume" (page 121).
- Volume expansion (LUN concatenation) can be performed even when the concatenation source volume is being formatted.

The procedure to expand volume capacity is as follows:

Procedure

1 Select the volume to be expanded and click [Expand Volume] in [Action].

2 Click the [Add] button.



→ The [Add Capacity] screen is displayed.

3 Select the RAID group to obtain the free space from, specify the capacity to be concatenated, and click the [OK] button.

- Capacity
  Input the capacity that is to be concatenated and select the units of capacity (MB/GB/TB).
  Up to a 15-digit number including the "." (decimal point) can be input. Note that when "MB" is selected, the specified value is rounded down to the nearest whole number. When "GB" or "TB" is selected, the specified value is converted to "MB" and rounded down to the nearest whole number.

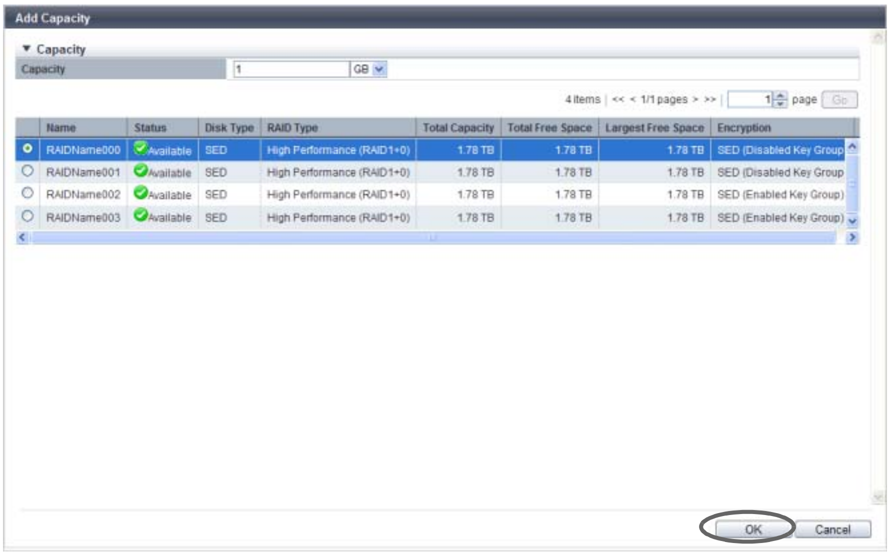
Note

Up to 15 numbers can be used. If a decimal point is included in the input value, up to 14 numbers can be used.
[Example] 0.1234567890123 (14 numbers and a decimal point)

- Select RAID Group
  Select the radio button of the RAID group to obtain free space from.

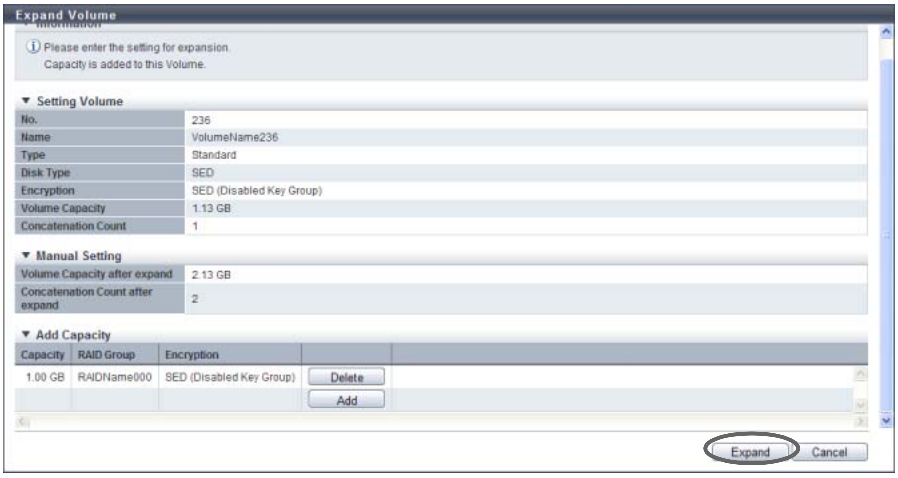
Caution

When "Disk Type" is "SED", selecting a RAID group with the same key group setting (Enabled Key Group/Disabled Key Group) as the RAID group to which the concatenation source volume belongs is recommended.



→ Returns to the [Expand Volume] screen.

4 Repeat Step 2 and Step 3 to select RAID groups and specify the capacity. After completing these settings, click the [Expand] button.



→ A confirmation screen appears.

5 Click the [OK] button.



→ Expansion of a volume starts.

6 Click the [Done] button to return to the [Volume] screen.

End of procedure

5.2.6 Expand Thin Provisioning Volume

This function expands the capacity of Thin Provisioning Volumes.

Requirements for expanding a TPV

- The capacity is not 128TB or more (for ODX Buffer volumes, the capacity must not be 1TB or more)
- There are no Advanced Copy sessions for which the copy range is "Totally" (*1)

  *1: "Totally" is specified for the copy range in the following conditions:
  - When performing a LUN to LUN copy session with the ETERNUS SF AdvancedCopyManager Copy Control Module (CCM)
  - When performing a copy session with ETERNUS SF AdvancedCopyManager Adapter for VMware Site Recovery Manager
  - When performing a copy session with ETERNUS VSS Hardware Provider
  - When performing a SnapOPC+ session that is specified with GUI or CLI
- Balancing is not being performed in the TPV
- RAID migration is not being performed in the TPV
- A Storage Migration path is not created in the TPV

The maximum capacity of Thin Provisioning Pool for each model

Model	Maximum TPP Capacity (TB)
ETERNUS DX80 S2	128
ETERNUS DX90 S2	128
ETERNUS DX410 S2	384
ETERNUS DX440 S2	768
ETERNUS DX8100 S2	768
ETERNUS DX8700 S2	1024

Caution

- This function cannot be performed when there are no TPVs in the ETERNUS DX Disk storage system.
- The total capacity of TPVs must be smaller than the maximum capacity of TPP.
- The ODX Buffer volume capacity must not exceed 1TB.
- This function cannot be performed when there is no free space for expansion in the ETERNUS DX Disk storage system.
- Expanded TPV capacity must be recognized by server.

The procedure to expand Thin Provisioning Volume capacity is as follows:

Procedure

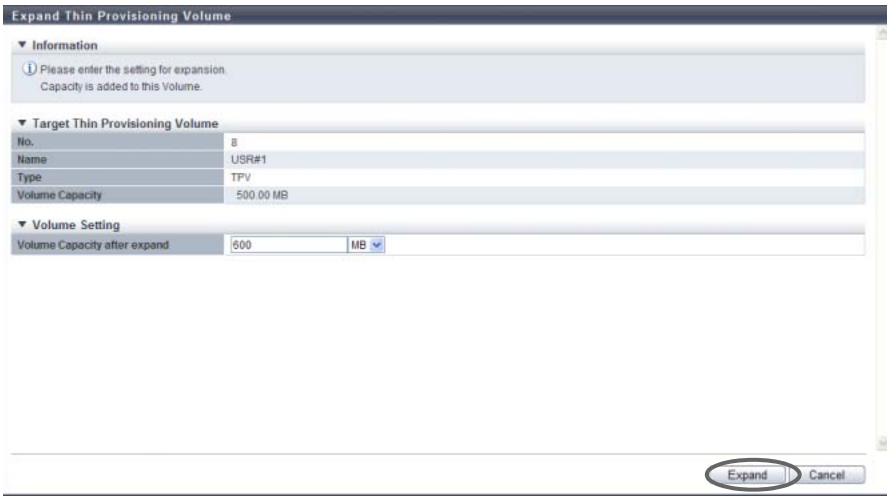
1 Select the TPV to be expanded and click [Expand TPV] in [Action].

2 Input the TPV capacity after expansion, and click the [Expand] button.

- Volume Capacity after expand
  Input the TPV capacity after expansion and select the units of capacity (MB/GB/TB).
  Up to a 15-digit number including the "." (decimal point) can be input. Note that when "MB" is selected, the specified value is rounded down to the nearest whole number. When "GB" or "TB" is selected, the specified value is converted to "MB" and rounded down to the nearest whole number.
  The following input conditions apply:
  - 25MB - 128TB (for volumes other than ODX)
  - 1025MB - 1TB (for ODX Buffer volumes)
  - Capacity after expansion must be larger than the current capacity

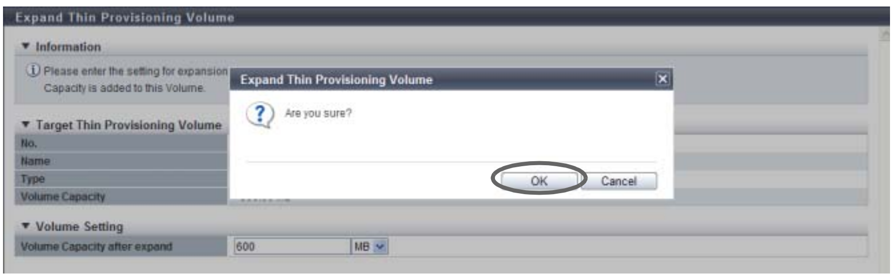
Note

Up to 15 numbers can be used. If a decimal point is included in the input value, up to 14 numbers can be used.
[Example] 0.1234567890123 (14 numbers and a decimal point)



→ A confirmation screen appears.

3 Click the [OK] button.



→ Expansion of a TPV starts.

4 Click the [Done] button to return to the [Volume] screen.

End of procedure

5.2.7 Start RAID Migration

RAID migration (hereinafter also referred to as migration) moves an existing volume in a RAID group, TPP, or FTRP to a free space in another RAID group, TPP, or FTRP. After migration is complete, the migration source volume is automatically deleted. This function can also be used to change the number of concatenations for Wide Striping Volumes (WSV).
Migration provides the following features:

- Load balancing of host access.
- Volume capacity expansion is available when migrating volumes. (only when the volume type is "Standard" or "WSV")
- The RAID type of the volume can be changed.
- The number of concatenations for WSVs can be increased or reduced.
- The Wide Stripe Size for WSVs can be changed.
- Because creation and format of new volumes and host interface establishment are automatically performed, users are allowed to access the data anytime without being affected by the migration.

Migration type

The combinations of volume types that can be migrated are as follows:

Migration source volume	Migration destination volume				
	Standard	Standard (LUN Concatenation)	WSV	TPV	FTV
Standard	Available	N/A	Available	Available (*1)	Available (*1)
Standard (LUN Concatenation)	Available	N/A	Available	Available (*1)	Available (*1)
WSV	Available	N/A	Available	Available (*1)	Available (*1)
TPV	Available (*2)	N/A	Available (*2)	Available	Available
FTV	Available (*2)	N/A	Available (*2)	Available	Available

Available: Migration is available
N/A: Migration is not available

*1: When migration from "Standard" or "WSV" to "TPV" or "FTV" is performed, 100% of the logical capacity of the "Standard" or "WSV" is allocated as the physical capacity for the "TPV" or "FTV". When "Start Zero Reclamation after migration" is enabled, the physical area that is filled with zeros can be released after the migration is complete.

*2: When migration from "TPV" or "FTV" to "Standard" or "WSV" is performed, 100% of the logical capacity of the "TPV" or "FTV" is allocated as the logical capacity for "Standard" or "WSV".

Combinations of Volume Types for which Capacity Expansion is Available

The combinations of volume types for which capacity expansion can be performed are shown in the following table.

Migration source volume	Migration destination volume				
	Standard	Standard (LUN Concatenation)	WSV	TPV	FTV
Standard	Available	–	Available	N/A	N/A
Standard (LUN Concatenation)	Available	–	Available	N/A	N/A
WSV	Available	–	Available	N/A	N/A
TPV	N/A	–	N/A	N/A	N/A
FTV	N/A	–	N/A	N/A	N/A

Available: Capacity expansion is available
N/A: Capacity expansion is not available
–: Migration is not available

Combinations of Encryption Conditions for which Migration is Available

The combinations of encryption conditions for which migration can be performed are shown in the following table.

Security priority	Encryption setting for the migration source volume	Encryption setting for the migration destination volume			
		None	by CM (*1)	use SED (Disabled Key Group) (*2)	use SED (Enabled Key Group) (*3)
Yes	None	Available	Available	Available	Available
	by CM	Available	Available	Available	Available
	use SED (Disabled Key Group)	Available	Available	Available	Available
	use SED (Enabled Key Group)	Available	Available	Available	Available
No (*4)	None	Available	Available	Available	Available
	by CM	N/A	Available	Available	Available
	use SED (Disabled Key Group)	N/A	Available	Available	Available
	use SED (Enabled Key Group)	N/A	N/A	N/A	Available

Available: Migration is available
N/A: Migration is not available

*1: When the encryption mode is disabled, "by CM" cannot be selected.

*2: SEDs that are managed by the common key (the RAID groups are not registered in the key group).

*3: SEDs for which the SED authentication key is managed by the key server (the RAID groups are registered in the key group). In this case, only RAID groups can be selected as the migration destination. Note that TPPs and FTRPs cannot be selected.

*4: If a user without the "Security Setting" policy logs into GUI, migration to reduce the security level cannot be performed.

Requirements for a migration source volume:

- The "Type" is "Standard", "WSV", "TPV", or "FTV"
- The "Status" is not " Broken"
- Formatting is not being performed (only when the volume type is "Standard" or "WSV")
- Migration is not being performed (the target volume is not used as a migration source or a migration destination)
- TPV balancing is not being performed
- FTRP balancing is not being performed (*1)
- LDE is not being performed for the RAID group to which the target volume belongs
- Encryption is not being performed for the target volume
- A Storage Migration path is not created in the target volume

*1: When the FTRP balancing is performed, the FTV balancing process starts in the FTSP. Refer to "7.2.12 Start Balancing Flexible Tier Pool" (page 248) for details.

Requirements for a migration destination RAID group:

- The maximum number of volumes are not set in the destination RAID group
  Migration creates new volumes. The maximum number of volumes that can be created depends on the ETERNUS DX Disk storage system model.

Model	per RAID group	per ETERNUS DX Disk storage system
ETERNUS DX80 S2		Up to 2048
ETERNUS DX90 S2		Up to 4096
ETERNUS DX410 S2/DX440 S2	Up to 128	Up to 16384
ETERNUS DX8100 S2		Up to 16384
ETERNUS DX8700 S2		Up to 65535

- "Standard", "WSV", "Snap Data Volume (SDV)", or "Snap Data Pool Volume (SDPV)" is registered in the RAID group or the RAID group is not being used
- The "Status" of the RAID group is " Available"
- The free space of the RAID group is more than the capacity of the migration source volume (*1)
- The RAID group does not belong to a TPP
- The RAID group does not belong to an FTRP
- The RAID group is not registered as an REC Disk Buffer
- The RAID group is not blocked
- The free space of the RAID group is more than the capacity of the migration source volume (*1)
- The RAID group is not the same RAID group as the RAID group to which the migration source volume belongs
- LDE is not being performed in the target RAID group

*1: When the migration source is a TPV or an FTV, the capacity of the migration source volume indicates the logical capacity of the TPV or the FTV.

Requirements for RAID groups that configure a migration destination WSV

- "Standard", "WSV", "SDV", or "SDPV" is registered in the RAID group or the RAID group is not being used
- The "Status" of the RAID group is " Available"
- The maximum number of volumes are not created in the RAID group (*1)
- The RAID group does not belong to a TPP
- The RAID group does not belong to an FTRP
- The RAID group is not registered as an REC Disk Buffer
- The RAID group is not blocked
- LDE is not being performed in the target RAID group
- When using existing RAID groups (RAID groups configure the migration source WSV) to increase the number of concatenations, the RAID groups that are added must satisfy the following conditions:
  - The RAID group is the same RAID type as the existing RAID groups
  - The number of member drives in the RAID group is the same as the existing RAID groups
  - The Stripe Depth value is the same as the existing RAID groups
  - The disk type is the same as the existing RAID groups
  - The disk speed is the same as the existing RAID groups (recommended)
  - The key group setting is the same as the existing RAID groups (recommended)
- When using existing RAID groups to increase the number of concatenations, all of the RAID groups, including the existing RAID groups, must have sequential free capacity to migrate volumes (*2)
- When reducing the number of concatenations, all of the RAID groups that configure a WSV must have sequential free capacity to migrate volumes (*2)
- The number of concatenations for RAID group must be 2 - 64

*1: When the migration destination is a WSV, one volume for each RAID group that configures striping is required (the same number of volumes as the number of RAID groups in total).

*2: Because the volume (a part of the WSV that is striped by each RAID group) is moved into the free area in the same RAID group when migration is performed, another sequential free area is required as a migration destination in addition to the currently used area in the RAID group.

Requirements for a migration destination TPP:

- The "Status" is " Available", " Partially Readying", or " Exposed"
- The capacity of the TPP is more than the capacity of the migration source volume (*1)
- The capacity of the migration source volume is less than the maximum TPP capacity (*2) for each model
- The TPP is not the same as the TPP to which the migration source volume belongs

*1: When the migration source is a TPV or an FTV, the capacity indicates used capacity (the physical capacity that is allocated from a TPP or an FTRP).

*2: The maximum TPP capacity is the total sum of the TPP capacity and the FTRP capacity in the ETERNUS DX Disk storage system. Refer to "7.2.1 Create Thin Provisioning Pool" (page 219) for details.

Requirements for a migration destination FTRP:

- The "Status" is " Available", " Partially Readying", or " Exposed"
- The capacity of the FTRP is more than the capacity of the migration source volume (*1)
- The capacity of the migration source volume is less than the maximum TPP capacity (*2) for each model
- The FTRP is not the same as the FTRP to which the migration source volume belongs

*1: When the migration source is a TPV or an FTV, the capacity indicates used capacity (the physical capacity that is allocated from a TPP or an FTRP).

*2: The maximum TPP capacity is the total sum of the TPP capacity and the FTRP capacity in the ETERNUS DX Disk storage system. Refer to "7.2.1 Create Thin Provisioning Pool" (page 219) for details.

Caution

- Migration cannot be performed under the following conditions:
  - When the maximum number of volumes is already registered in the ETERNUS DX Disk storage system
  - When a RAID group diagnosis or a disk diagnosis is being performed in the ETERNUS DX Disk storage system
  - When the RAID group to which the migration source volume belongs is blocked or failed
  - When Advanced Copy is being performed by specifying the whole volume in the migration source volume and the settings for the volume capacity that is to be expanded are performed before and after migration
  - When the total number of migration, TPV balancing, and FTRP balancing (*1) processes that are running in the ETERNUS DX Disk storage system exceed 32
  - When the total capacity of the migration, TPV balancing, and FTRP balancing (*1) processes that are running in the ETERNUS DX Disk storage system exceeds 128TB

  *1: When the FTRP balancing is performed, the FTV balancing process starts in the FTSP. Refer to "7.2.12 Start Balancing Flexible Tier Pool" (page 248) for details.
- A volume cannot be expanded when the type of migration source volume is "TPV" or the type of migration destination is "TPP".
- A volume cannot be expanded when the type of migration source volume is "FTV" or the type of migration destination is "FTRP".
- Even if the volume type is "Standard", the maximum ODX Buffer volume capacity is 1TB.
- A migration source volume and a migration destination volume that are undergoing migration cannot be deleted.
- When performing migration for volumes for which "Cache Page Capacity" is changed using the procedure in "5.2.18 Modify Cache Parameters" (page 148), the "Cache Page Capacity" setting is reset to the initial value (unlimited).
- When the destination volume capacity is expanded by migration, the expanded volume capacity must be recognized by the server after migration. Refer to the manuals of each OS or file system for information about server operation.
- When " Attention" or " Warning" is displayed in the "Used Status" field for the migration destination TPP after migration, the used capacity of the relevant TPP is exceeding the threshold. In this case, expand TPP capacity by using the procedure in "7.2.4 Expand Thin Provisioning Pool" (page 231). Refer to "7.1.1 Thin Provisioning Pool (Basic Information)" (page 200) for TPP usage.
- When " Attention" or " Warning" is displayed in the "Used Status" field for the migration destination FTRP after migration, the used capacity of the relevant FTRP is exceeding the threshold. Use ETERNUS SF Storage Cruiser to expand the capacity of the appropriate FTSP (for which expansion is determined to be necessary based upon the performance and usage). Refer to "7.1.5 Flexible Tier Pool (Basic Information)" (page 207) for FTRP usage.

Note

- Progress of migration can be checked on the [Volume Detail] screen (Basic). Refer to "5.1.9 Volume Detail (Basic)" (page 88) for details.
- If the migration source and migration destination are both "WSV", not only can the migration of a WSV to other multiple RAID groups be performed, but also the number of concatenations for the existing RAID group can be changed.
- When Zero Reclamation is reserved after migrating from "Standard" to "TPV" or from "Standard" to "FTV", the physical area that is filled with zeros is released and the Thin Provisioning function can be used efficiently. For volumes that are reserved for Zero Reclamation, "Reserved Zero Reclaim" is displayed in the "Process" field on the [Volume] screen. When Zero Reclamation is performed after the migration is complete, the progress of Zero Reclamation can be checked with "Zero Reclamation Progress" on the [Volume Detail] screen (Basic). Refer to "5.1.9 Volume Detail (Basic)" (page 88) for details.

When the migration destination volume type is "Standard", "TPV", or "FTV"

The procedure to start a migration is as follows:

Procedure

1. Select the volume that to be migrated and click [Start RAID Migration] in [Action].
2. Select "RAID Group / Thin Provisioning Pool / Flexible Tier Pool" for "Destination Migration".
   Set the volume information after migration, select the destination RAID group, the TPP, or the FTRP, and then click the [Start] button.
   - Volume Capacity
     The capacity of the migration source volume is displayed as the initial state.
     When expanding the volume capacity after migration, specify the volume capacity and select the unit of capacity (MB/GB/TB).
     Up to a 15-digit number including the "." (decimal point) can be input. Note that when "MB" is selected, the specified value is rounded down to the nearest whole number. When "GB" or "TB" is selected, the specified value is converted to "MB" and rounded down to the nearest whole number.

   Note

   Up to 15 numbers can be used. If a decimal point is included in the input value, up to 14 numbers can be used.
   [Example] 0.1234567890123 (14 numbers and a decimal point)

   Caution

   Volume capacity cannot be expanded in the following conditions:
   - When "TPV" or "FTV" is selected as the migration source volume
   - When "Thin Provisioning Pool" or "Flexible Tier Pool" is selected as the migration destination

Migration source volume capacity	≤	Volume capacity	≤	The maximum free capacity in the migration destination

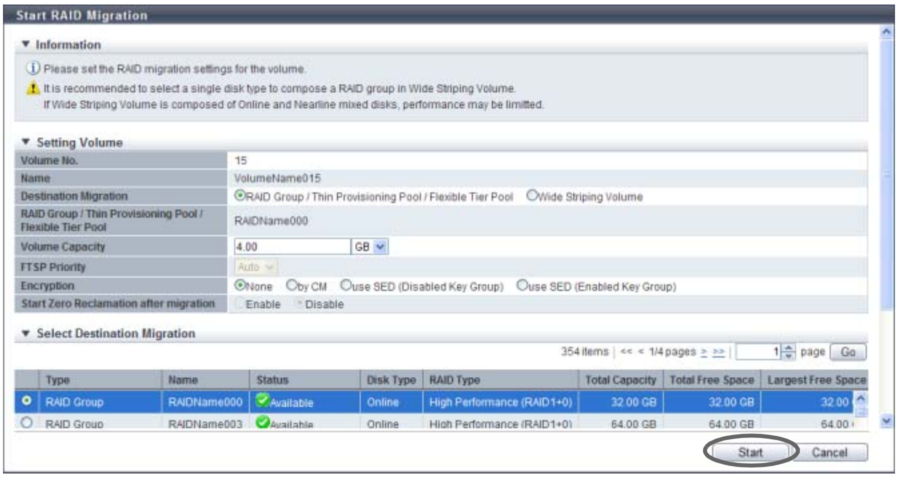
- FTSP Priority
  Select either "Auto" or the FTSP number that belongs to the migration destination FTRP for the FTSP number to which priority is given.
  When FTRP is not selected from the migration destination list, only "Auto" is displayed as the available option. If FTRP is specified, "Auto" and the FTSP numbers that belong to the migration destination FTRP are displayed. If "FTSP number" is selected and the specified FTRP is changed, the "FTSP Priority" setting returns to the default value ("Auto").
  "FTSP Priority" indicates the FTSP number to which priority is given for allocating physical capacity as the volume migration destination when multiple FTSPs exists in the migration destination FTRP.
  When "Auto" is selected, the physical area is allocated to an FTSP for which the disk type is "Online". If no free space exists in "Online" type disks and migration is not available, the physical area is allocated to an FTSP for which the disk type is "Nearline". If "Nearline" is also not available for migration, the physical area is allocated to an FTSP for which the disk type is "SSD". Migration to an FTRP cannot be performed if "SSD" is not available for migration. "SED" type FTSPs are used as "Online" type FTSPs.
  When "FTSP number" is selected, the physical area is allocated to the selected FTSP. If there is no free space in the selected FTSP and migration is not available, the migration destination FTSP number is determined as having the same priority ("Online" → "Nearline" → "SSD") as when "Auto" is selected.
  The disk type for FTSPs can be checked from the [Flexible Tier Pool Detail] screen (Flexible Tier Sub Pool). Refer to "7.1.8 Flexible Tier Pool Detail (Flexible Tier Sub Pool)" (page 214) for details.
- Encryption
  The encryption status of the migration source volume is displayed as the initial state.
  Select the encryption status of the volume after migration. There are no limitations for the encryption status of migration source and destination volumes. Note that when migrating an encrypted volume to an unencrypted volume, the user must have the "Security Setting" policy.
  Refer to "Combinations of Encryption Conditions for which Migration is Available" (page 124) for details.
  - None
  - by CM
  - use SED (Disabled Key Group)
  - use SED (Enabled Key Group)

  Caution

  - When "use SED (Disabled Key Group)" or "use SED (Enabled Key Group)" is selected for "Encryption", use an SED for the migration destination.
  - When "None" or "by CM" is selected for "Encryption", do not use SEDs for the migration destination. Use other type of disks.
  - When the encryption mode is disabled, "by CM" cannot be selected.

- Start Zero Reclamation after migration
  Select "Enable" or "Disable" for the Zero Reclamation of source volumes after migration is complete.
  When Zero Reclamation after migration is enabled, the source volume will be reserved for Zero Reclamation.
  "Zero Reclamation" is a function that releases the allocated physical area when data in the physical area that is allocated to a TPV or an FTV is filled with zeros.
  This item is available only when the migration destination is "Thin Provisioning Pool" or "Flexible Tier Pool".

- Select Destination Migration
  Specify the destination RAID group, the TPP, or the FTRP with the radio button. The RAID groups, TPPs, or FTRPs that can be used for migration are displayed (this is determined by the volume capacity and the encryption status).

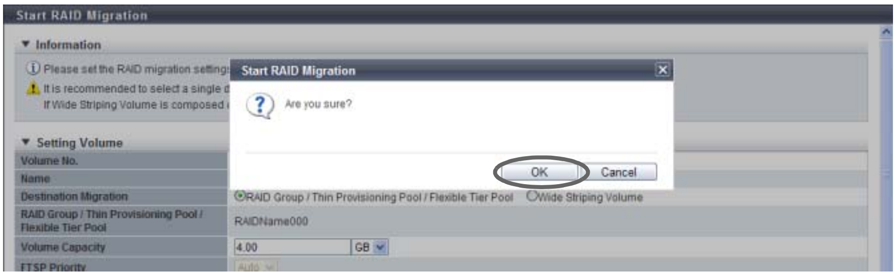


→ A confirmation screen appears.

Caution

- If the migration source is an ODX Buffer volume, select "RAID Group / Thin Provisioning Pool / Flexible Tier Pool" for "Destination Migration".
- An error screen appears in the following conditions:
  - When the "Volume Capacity" is not input
  - When "Volume Capacity" does not satisfy the input conditions
  - When "Enable" is selected for "Start Zero Reclamation after migration" while Zero Reclamation is being performed in a migration source volume
  - When the migration source is an ODX Buffer volume and "Enable" is selected for "Start Zero Reclamation after migration"

3 Click the [OK] button.



→ Migration starts.

4 Click the [Done] button to return to the [Volume] screen.

End of procedure

When the migration destination volume is "WSV"

Note

When changing the number of concatenations for a WSV, check "Wide Stripe Size" for the WSV, the specifications of the existing RAID groups (RAID type, Stripe Depth, disk type, disk speed, and number of member drives), and the name of all the concatenated RAID groups. The following describes how to check the specifications.

(1) Click the [No.] link or the [Name] link of the migration source WSV in the volume list.

(2) A detailed information screen for the WSV is displayed. Check "Wide Stripe Size" in the [Basic] tab screen.

(3) Click the [WSV Concatenation] tab to display the concatenation information of the WSV. Check "RAID Group Name" and "Concatenation Order" that are configured for the WSV.

(4) Filter the RAID group list by the RAID group name that configures a WSV, and then click the [No.] link or the [Name] link of the RAID group. Any RAID group can be specified because the RAID groups in the WSV have the same specifications.

(5) A detailed information screen for the RAID group is displayed. Check "RAID Type" and "Wide Stripe Size" in the [Basic] tab screen.

(6) Click the [Disk] tab to display the information of the drives that are configured for the RAID group. Check "Disk Type", "Speed", and "Number of Member Disks". For "Number of Member Disks", use the displayed number of drives.

The procedure to start a migration is as follows:

Procedure

1 Select the volume that to be migrated and click [Start RAID Migration] in [Action].

2 Select "Wide Striping Volume" for "Destination Migration". Input the volume capacity, the encryption status, the detailed information of volumes, and the selection information for the RAID groups, and click the [Select RAID Groups] button.

- Setting Volume

- Volume Capacity
  The capacity of the migration source volume is displayed as the initial state.
  When expanding the volume capacity after migration, enter the volume capacity and select the unit of capacity (MB/GB/TB).
  Up to a 15-digit number including the "." (decimal point) can be input. Note that when "MB" is selected, the specified value is rounded down to the nearest whole number. When "GB" or "TB" is selected, the specified value is converted to "MB" and rounded down to the nearest whole number.

Note

Up to 15 numbers can be used. If a decimal point is included in the input value, up to 14 numbers can be used.
[Example] 0.1234567890123 (14 numbers and a decimal point)

Caution

When "TPV" or "FTV" is selected as the migration source volume, volume expansion is not available.

Migration source volume capacity	≤	Volume capacity

- Encryption
  The encryption status of the migration source volume is displayed as the initial state.
  Select the encryption status of the volume after migration. There are no limitations for the encryption status of migration source and destination volumes. Note that when migrating an encrypted volume to an unencrypted volume, the user must have the "Security Setting" policy. Refer to "Combinations of Encryption Conditions for which Migration is Available" (page 124) for details.
  - None
  - by CM
  - use SED (Disabled Key Group)
  - use SED (Enabled Key Group)

Caution

- When "use SED (Disabled Key Group)" or "use SED (Enabled Key Group)" is selected for "Encryption", use an SED for the migration destination.
- When "None" or "by CM" is selected for "Encryption", do not use SEDs for the migration destination. Use other type of disks.
- When the encryption mode is disabled, "by CM" cannot be selected.

Wide Striping Volume Setting

WSVs are created by concatenating volumes that are the same size in multiple RAID groups. Input the volume information for the migration destination WSV and the selection information for the RAID groups, and then specify the RAID groups that are to be concatenated.

Caution

- The conditions for RAID groups to configure WSVs are as follows:
  - The RAID type must be the same
  - The number of member drives in the RAID group must be the same
  - The Stripe Depth value must be the same
  - The disk type (Online/Nearline/SSD/SED) must be the same
    (since the access performance of WSVs is reduced, do not select "Online/Nearline".)
  - The disk speed must be the same
    (RAID groups configured with different speed drives can be selected. Note that this reduces the access performance for WSVs. It is recommended to select the same speed disks. The speed of the drives that configure a RAID group can be checked in the [RAID Group Detail] screen ([Disk] tab).)
  - The key group setting is the same as the existing RAID groups
    (When "Disk Type" is "SED", RAID groups with the key group setting enabled or disabled can be selected. Selecting the same key group setting status is recommended. Not doing so reduces the access performance for WSVs. The key group setting status can be checked with the "Encryption" field in the [Select RAID Groups] screen.)
  - The sequential unused area must be the same size or bigger than the capacity of the volumes that are to be concatenated
- The number of concatenated RAID groups is from 2 to 64.
- The WSV capacity is from 24MB to 128TB.
- When changing the number of concatenations for a WSV, specifying the existing RAID groups is required. For the details, refer to "Remarks" in "When the migration destination volume is "WSV"" (page 131).

Volume Information

Input the volume information of the migration destination WSV.

- Wide Stripe Size
  Select the Wide Stripe Size ("Normal" or "Small") for the volumes.
  "Wide Stripe Size" is the size of the WSV Unit that is allocated to each RAID group in series. It is not necessary to change the default setting (Normal) for normal use.
  - Normal
    An integral multiple of the basic size for each RAID group (*1). The maximum size is 16MB or smaller.
    The actual size varies according to the RAID group type, the number of member disks, and Stripe Depth.
    Select "Normal" to improve random write access performance.
  - Small
    An integral multiple of the basic size for each RAID group. The maximum size is 2MB or smaller.
    The actual size varies according to the RAID group type, the number of member disks, and Stripe Depth.
    Note that because the segment size of the volume is small and many host accesses among multiple RAID groups occur, the performance may be reduced.

*1: The basic size (stripe size) when creating a volume. Refer to "E.1 Basic Size for each RAID Group" (page 995) for details.

Caution

- If the basic size of the RAID group is 2MB or more, the basic size is specified for Wide Stripe Size even when "Small" is selected.
- When changing the number of concatenations for a WSV, select the same "Wide Stripe Size" as the migration source WSV. Refer to "When the migration destination volume is "WSV"" (page 131) for procedure to check "Wide Stripe Size" for the destination source WSV.

Note

"Wide Stripe Size" for an existing WSV can be changed by using the migration function.

- Concatenation Order
  Select the concatenation order of RAID groups from "Automatic" or "Manual". It is not necessary to change the default setting (Automatic) for normal use.
  - Automatic
    Automatically specify the concatenation order of RAID groups.
    If multiple WSVs are already registered, the next available RAID group that enables the controlling CM allocation to be distributed evenly is selected as [1] for the concatenation order. If multiple RAID groups satisfy this condition, the RAID group with the smallest RAID group number is selected as [1] in the concatenation order. RAID groups are concatenated starting from [1] (first) in ascending order. The last RAID group is concatenated to the first RAID group.
    Volumes that belong to the RAID group that is first in the concatenation order are called "representative volumes".
  - Manual
    Manually specify the concatenation order of the RAID group.

  Caution

  When changing the number of concatenations for a WSV, specify the same concatenation order as the migration source WSV. Refer to "Remarks" in "When the migration destination volume is "WSV"" (page 131) for the procedure to check the concatenation order of migration source WSVs. When "Manual" is selected for "Concatenation Order", the concatenation order can be changed. It is not necessary to change the default setting (Automatic) if the concatenation order after migration can be changed.

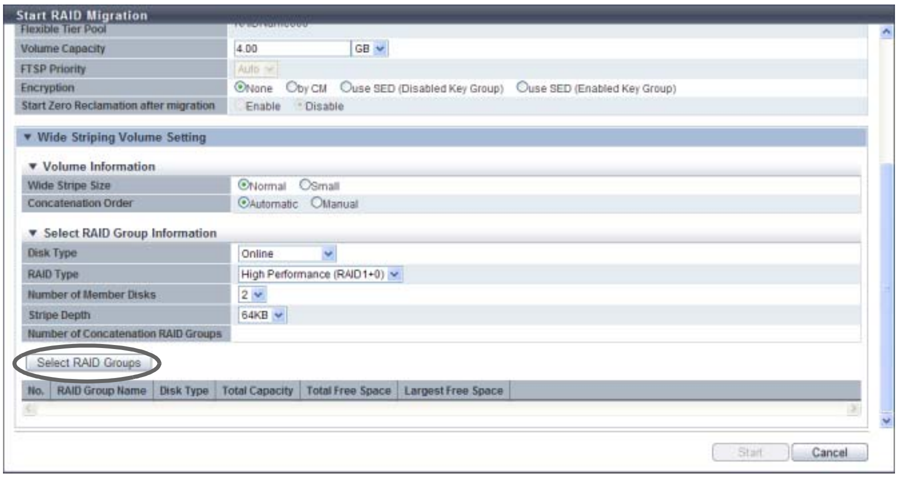
Select RAID Group Information

Input information for the RAID group that configures the migration destination WSV.

Caution

When changing the number of concatenations for a WSV, select the same "Disk Type", "RAID Type", "Number of Member Disks", and "Stripe Depth" as the migration source WSV. Refer to "Remarks" in "When the migration destination volume is "WSV"" (page 131) for the procedure to check the specifications of an existing RAID group.

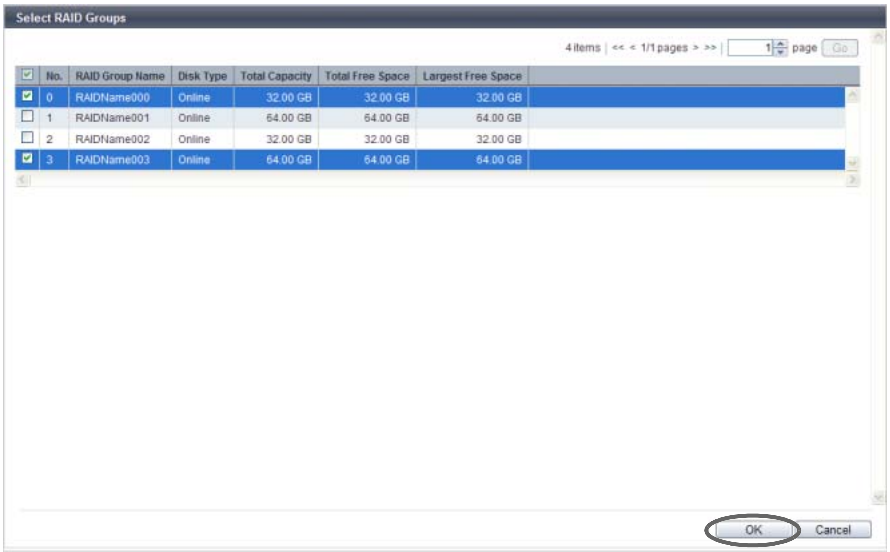
- Disk Type
  Specify the drive type.
  The installed drive determine the selectable disk types that are displayed.
  If there are no RAID groups in which volumes can be created, the field is blank.
  - Online
  - Nearline
  - SSD
  - SED
  - Online/Nearline
- RAID Type
  Select the RAID type.
  If there are no RAID groups in which volumes can be created, the field is blank.
  - High Performance (RAID1+0)
  - High Capacity (RAID5)
  - High Reliability (RAID6)
  - Reliability (RAID5+0)
  - Mirroring (RAID1)
  - Striping (RAID0)
- Number of Member Disks
  Select the number of member disks in the RAID group.
  The selectable number of member disks, which is determined by the specified RAID type, is displayed.
  If there are no RAID groups in which volumes can be created, the field is blank.
  - High Performance (RAID1+0)
    4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32
  - High Capacity (RAID5)
    3 - 16
  - High Reliability (RAID6)
    5 - 16
  - Reliability (RAID5+0)
    6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32
  - Mirroring (RAID1)
    2
  - Striping (RAID0)
    2 - 16
- Stripe Depth
  Select the Stripe Depth of the RAID group.
  The selectable Stripe Depth varies depending on the specified RAID type. Refer to "Available Stripe Depth value" (page 180) for details.
  If "Mirroring (RAID1)" is selected as the RAID type, a "-" (hyphen) is displayed.
  If there are no RAID groups in which volumes can be created, the field is blank.
  - 64 KB
  - 128 KB
  - 256 KB
  - 512 KB
  - 1024 KB



→ The [Select RAID Groups screen] screen appears.

3 Select the RAID group that is to be concatenated (multiple selections can be made) and click the [OK] button.

- Select RAID Groups
  Select the checkbox for the RAID group that is to be concatenated.

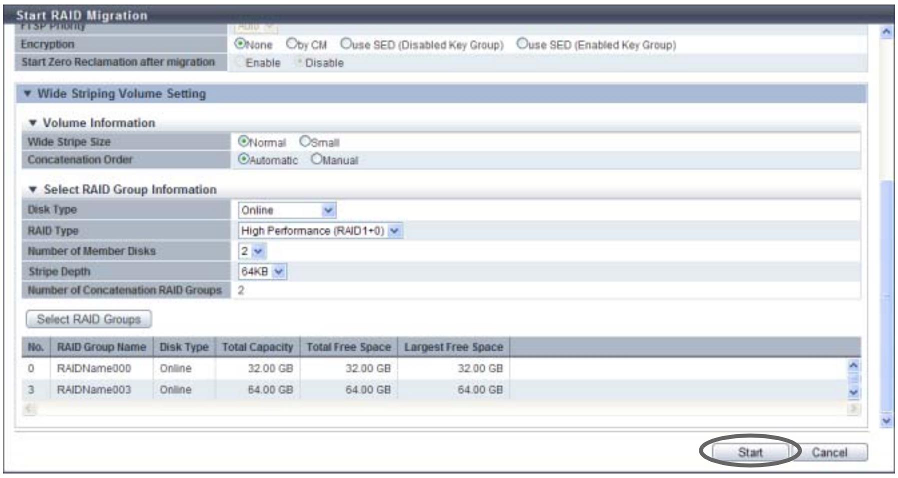


→ The display returns to the initial screen.

Caution

- When increasing the number of concatenations for a WSV, select all of the existing RAID groups for concatenation and the new RAID groups. When reducing the number of concatenations for a WSV, select the RAID groups that will remain for concatenation from the existing RAID group list. For the details, refer to "Remarks" in "When the migration destination volume is "WSV"" (page 131).
- When "Disk Type" is "SED", setting the same "Encryption" settings (the setting status of the key group) is recommended for all of the RAID groups that configure the WSV.

4 After selecting RAID groups is complete, click the [Start] button.



→ A confirmation screen appears.

Caution

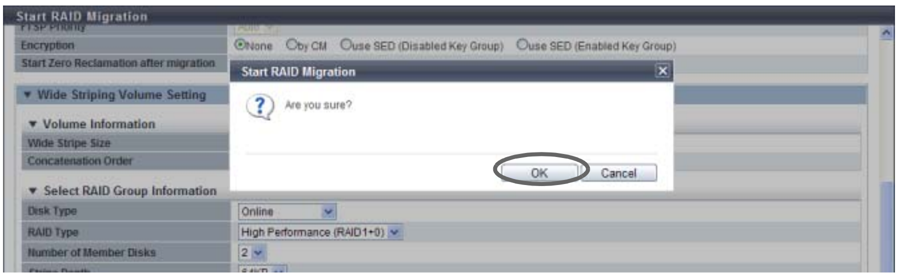
In the following cases, an error screen appears:

- When the capacity is not specified for "Volume Capacity"
- When "Volume Capacity" does not satisfy the input conditions
- When the "Number of Concatenation RAID Groups" field is left blank, "1" is specified, or a value that is "65" or more is specified
- When the maximum free space in the selected RAID group is smaller than the volume size that is to be concatenated
- When an ODX Buffer volume is selected as a migration source volume

Note

To change the concatenation order of the RAID groups, select "Manual" for "Concatenation Order" in the Volume Information field. Click the [Concatenation Order] link to display the [Setting Concatenation Order] screen. The concatenation order of the RAID groups can be changed in the [Setting Concatenation Order] screen.

5 Click the [OK] button.



→ Migration starts.

6 Click the [Done] button to return to the [Volume] screen.

End of procedure

5.2.8 Stop RAID Migration

This function stops RAID migration.

Caution

This function cannot be executed when migration is not being performed for the selected volume.

Note

- If migration is canceled, the reservation for Zero Reclamation is released.
- When migration is stopped, data in the migration source volume can be accessed normally.

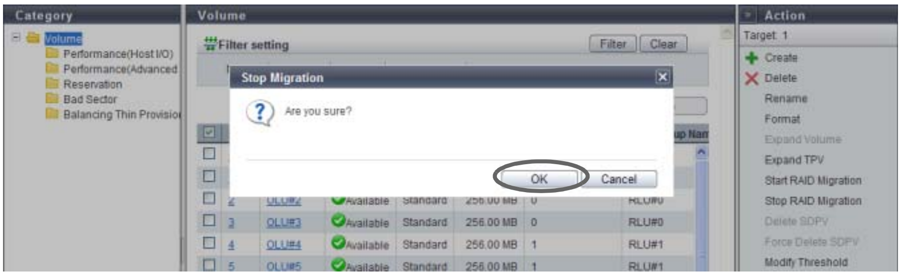
The procedure to stop migration is as follows:

Procedure

1 Select the volume for which migration is to be stopped (multiple selections can be made) and click [Stop RAID Migration] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ The stop migration process starts.

3 Click the [Done] button to return to the [Volume] screen.

End of procedure

5.2.9 Start Zero Reclamation

"Zero Reclamation" is a function that releases the allocated physical area when data in the physical area that is allocated to a TPV or an FTV is filled with zeros.
This function starts Zero Reclamation.

Volume requirements for starting Zero Reclamation:

- Volumes for which "Type" is "TPV" or "FTV"
- Volumes without " Readying" status, " Not Ready" status, or " Broken" status
- Volumes that are not undergoing Zero Reclaiming or volumes that are not reserved for Zero Reclamation
- Volumes that are not ODX Buffer volumes
- Volumes that are not undergoing RAID migration
- Volumes that are not undergoing TPV balancing
- FTVs that are not undergoing FTRP balancing

Caution

This function cannot be performed when the storage system status is "Not Ready".

Note

- The Thin Provisioning function and the Flexible Tier (automatic storage layering) function can be effectively used by using Zero Reclamation when system configurations or system environment modifications are performed. Examples of when to use Zero Reclamation are as follows:
  - After the initialization of the OS or the file system (such as writing 0 data to all the volumes) is complete
  - After RAID migration from "Standard" to "TPV" is complete
  - After RAID migration from "Standard" to "FTV" is complete
- The progress of Zero Reclamation can be checked with "Zero Reclamation Progress" on the [Volume Detail] screen (Basic). Refer to "5.1.9 Volume Detail (Basic)" (page 88) for details.
- Zero Reclamation can be reserved for the destination volume of the RAID migration. Refer to "5.2.7 Start RAID Migration" (page 123) for details.

The procedure to start Zero Reclamation is as follows:

Procedure

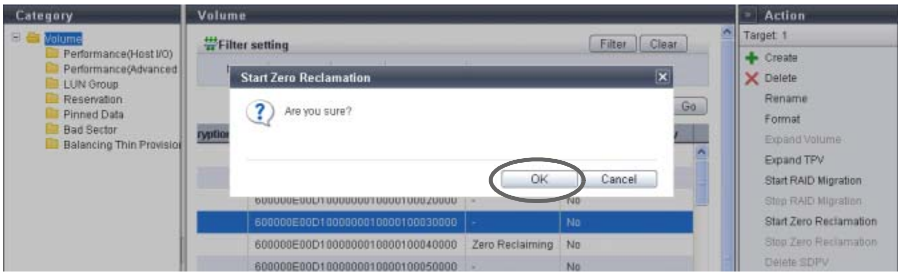
1 Select the volume to start Zero Reclamation (multiple selections can be made), and click [Start Zero Reclamation] in [Action].

→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:
- When switching controller firmware is being performed
- When the concurrent firmware upgrade is being performed

2 Click the [OK] button.



→ Zero Reclamation starts.

3 Click the [Done] button to return to the [Volume] screen.

End of procedure

5.2.10 Stop Zero Reclamation

This function stops Zero Reclamation.

Caution

- Zero Reclamation cannot be suspended and restarted (restarting Zero Reclamation from where it was stopped). If Zero Reclamation is stopped and then started again, the Zero Reclamation process starts from the first volume at the top again.
- This function cannot release the volumes that are reserved for Zero Reclamation. The reservation status of Zero Reclamation is released only when RAID migration is stopped.
- This function cannot be performed when the storage system status is "Not Ready".

Note

The progress of Zero Reclamation can be checked with "Process" on the [Volume] screen. Refer to "5.1.1 Volume (Basic Information)" (page 74) for details.

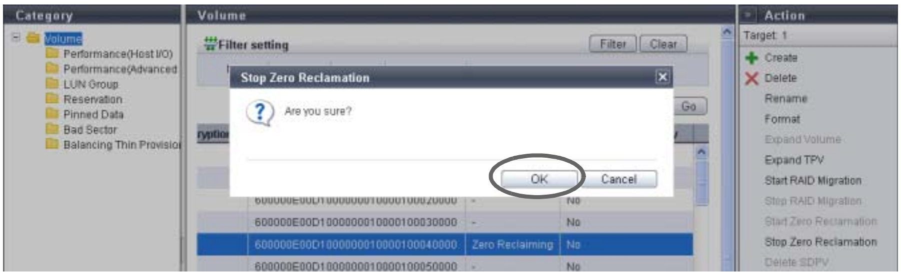
The procedure to stop Zero Reclamation is as follows:

Procedure

1 Select the volume to stop Zero Reclamation (multiple selections can be made), and click [Stop Zero Reclamation] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ Zero Reclamation stops.

3 Click the [Done] button to return to the [Volume] screen.

End of procedure

5.2.11 Delete Snap Data Pool Volume

An SDPV is a logical volume that is created in the SDP.
This function deletes SDPVs to reduce SDP capacity.

Caution

If the target SDPV is currently being used, it will be deleted after the SDPV is released.

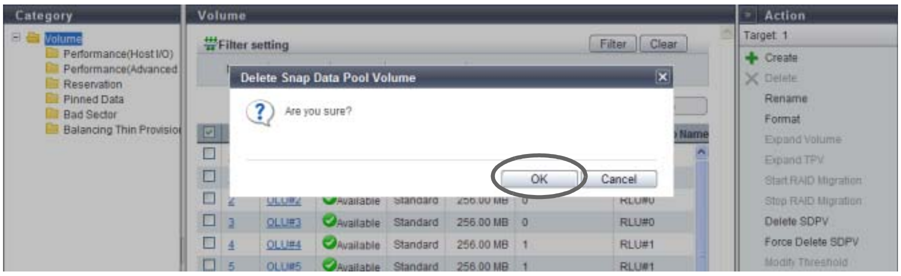
The procedure to delete an SDPV is as follows:

Procedure

1 Select the SDPV to be deleted (multiple selections can be made) and click [Delete SDPV] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ Deletion of SDPV starts.

Caution

If the SDPV is currently being used, the target SDPV status is changed to "Reserved Deletion". The "Reserved Deletion" status can be checked in the [Volume (Basic)] screen.

3 Click the [Done] button to return to the [Volume] screen.

End of procedure

5.2.12 Force Delete Snap Data Pool Volume

An SDPV is a logical volume that is created in the SDP.
This function forcibly deletes an SDPV regardless of whether it being used or not to reduce SDP capacity.

Caution

- If the target SDPV is being used by a copy session, an error stops the copy session, and then the SDPV is deleted.
- A SDPV that is in "Reserved Deletion" status can be deleted.

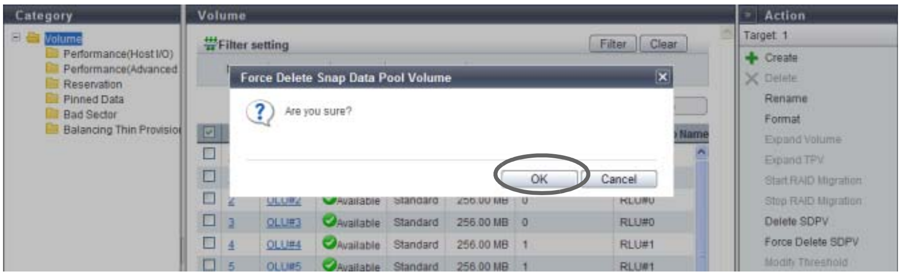
The procedure to forcibly delete an SDPV is as follows:

Procedure

1 Select the SDPV to be deleted (multiple selections can be made) and click [Force Delete SDPV] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ Deletion of SDPV starts.

3 Click the [Done] button to return to the [Volume] screen.

End of procedure

5.2.13 Modify Threshold Thin Provisioning Volume

This function changes the threshold for monitoring the used capacity of Thin Provisioning Volume. There is an "Attention" threshold.

Caution

This function cannot be performed when there are no TPVs in the ETERNUS DX Disk storage system.

Note

- This function changes the threshold of a TPV that is created by using the procedure in "5.2.1 Create Volume" (page 96).
- The same threshold can be applied for multiple TPVs in a single operation.

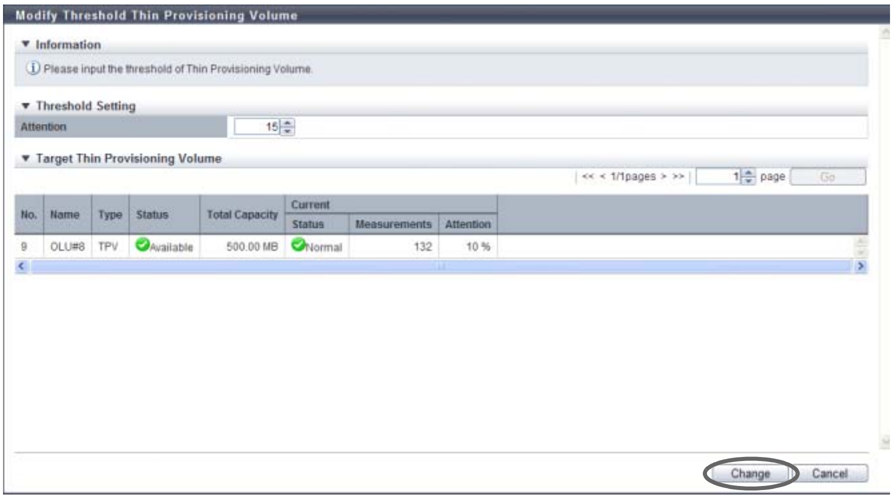
The procedure to change the threshold of Thin Provisioning Volume is as follows:

Procedure

1 Select the TPV for which the threshold is to be changed (multiple selections can be made) and click [Modify Threshold] in [Action].

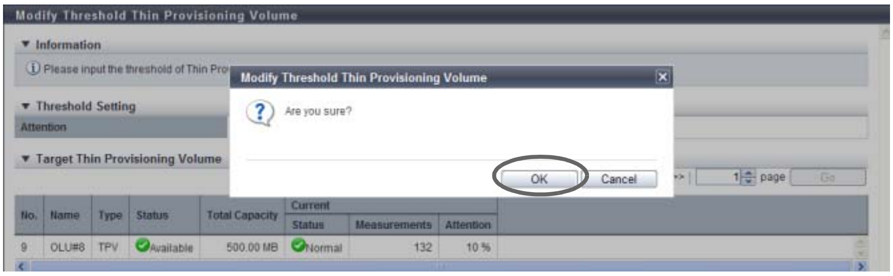
2 Specify the new threshold, and click the [Change] button.

- Attention
  Select between 1 and 200 [%] for the Attention threshold for monitoring the used capacity of the Thin Provisioning Volume. The default value is 10 [%].
  The Attention threshold is determined by the ratio of "Free space in the TPP to which the TPV belongs" to "Non-allocated TPV capacity".



→ A confirmation screen appears.

3 Click the [OK] button.



→ Thin Provisioning threshold modification starts.

4 Click the [Done] button to return to the [Volume] screen.

End of procedure

5.2.14 Initialize Snap Data Volume

This function initializes an SDV.
An SDV is a copy destination volume for SnapOPC and SnapOPC+ that includes a data area and a copy control information area. SDV initialization is performed when the capacity that can be used for the data area is insufficient due to a large amount of writing being requested from the host to an SDV for any reason (such as an operation mistake). SDV initialization is also performed when no more writing is allowed due to a notification being reported to the host for a writing request that exceeds the SDV capacity.

Caution

- After initializing an SDV, any data that is stored in the SDV cannot be accessed. Make sure to backup the required data.
- This function cannot be used under the following conditions:
  - When the target volume is not an SDV
  - When LDE is being performed in the RAID group to which the target volume belongs
  - When the target volume status is not " Available"
  - When Advanced Copy is being performed in the target volume

Note

When an SDV is initialized, the area that is allocated from the SDPV to the SDV is released.

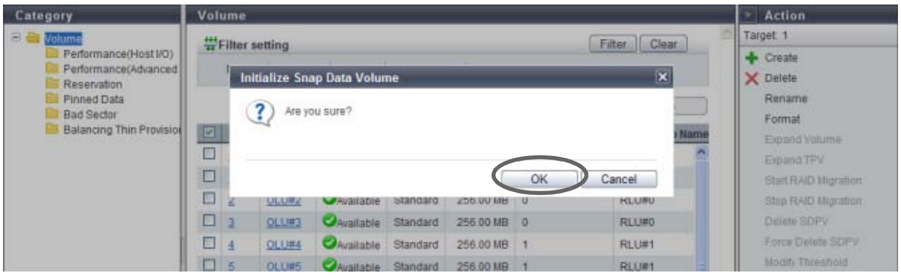
The procedure to initialize an SDV is as follows:

Procedure

1 Select the SDV to be initialized (multiple selections can be made) and click [Initialize SDV] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ Initialization of the SDV starts.

3 Click the [Done] button to return to the [Volume] screen.

End of procedure

5.2.15 Encrypt Volume

This function encrypts existing volumes.

Caution

- When using this function, enable the encryption mode. Refer to "11.2.13.5 Setup Encryption Mode" (page 941) for details.
- This function is used to prevent data leakage due to removal of disks, and cannot prevent data leakage caused by server access.
- Encrypted volumes cannot be changed to non-encrypted volumes.
- "Standard", "WSV", and "SDV" type volumes can be encrypted.
- Canceling volume encryption is not possible.
- This function cannot be used under the following conditions:
  - When a RAID group diagnosis is being performed
  - When a disk diagnosis is being performed
  - When firmware is being switched in hot mode
  - When disk firmware is being applied
  - When the status of the ETERNUS DX Disk storage system is other than "Normal"

- The following volumes cannot be encrypted:
  - Volumes without " Available" status
  - Volumes undergoing RAID migration
  - Volumes undergoing encryption
  - Volumes undergoing formatting or LUN Concatenation
  - Volumes registered in a RAID group undergoing LDE
  - Volumes in which the drives that configure the RAID group are undergoing rebuild, copyback, or redundant copy
  - Volumes in which the drives that configure the RAID group are "SED"
  - Volumes which belong to a RAID group for which the Stripe Depth value is changed (*1)

  *1: A RAID group for which the Stripe Depth value is 128KB or more. Note that the Stripe Depth value for RAID1 cannot be changed. Refer to "6.1.5 RAID Group (Basic)" (page 169) for details.
  - Volumes with Storage Migration paths
- The following performance may be reduced for encrypted volumes compared with non-encrypted volumes:
  - Access to the encrypted volumes
  - Copy transfer of encrypted volumes
- Up to 64 volumes can be encrypted at the same time. Note that if concatenated volumes are selected, the maximum number of volumes that can be encrypted is less than 64.

Note

TPVs cannot be encrypted with this function. TPVs that are created in an encrypted TPP are encrypted.

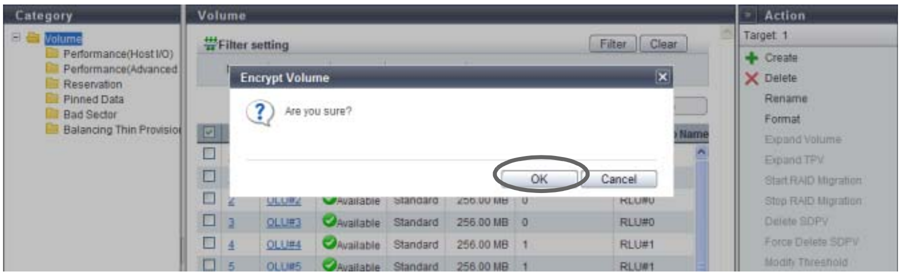
The procedure to encrypt a volume is as follows:

Procedure

1 Select the volume to be encrypted (multiple selections can be made) and click [Encrypt Volume] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ Encryption of the volume starts.

3 Click the [Done] button to return to the [Volume] screen.

End of procedure

5.2.16 Forbid Advanced Copy

This function protects a volume so that the volume cannot be registered as the copy destination volume of Advanced Copy.
The [Forbid Advanced Copy] is a function that protects the data in the selected volumes by forbidding the volume to be the copy destination of the Advanced Copy sessions or restoration setting. When the Advanced Copy function is used by multiple software, the same volumes may be used by multiple software, resulting in unexpected data corruption. This function is available to protect the data in the copy source from being deleted.

Caution

- If an Advanced Copy license is not registered, volume protection is not enabled. However, when using the ETERNUS DX80 S2/DX90 S2, a free license is registered by default and volumes can be protected.
- "Standard", "TPV", "WSV", and "FTV" type volumes can be protected. Note that the ODX Buffer volumes cannot be protected even when the volume type is "Standard", "TPV" or "FTV".
- This function cannot be used for volumes that are already protected.

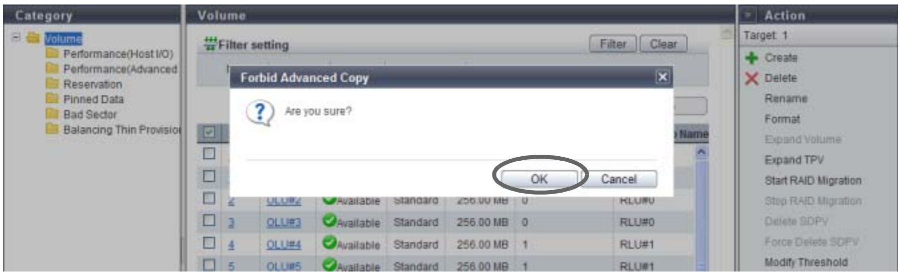
The procedure to protect a volume is as follows:

Procedure

1 Select the volume to be protected (multiple selections can be made) and click [Forbid Advanced Copy] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ Setting of the copy destination protect starts.

3 Click the [Done] button to return to the [Volume] screen.

End of procedure

5.2.17 Permit Advanced Copy

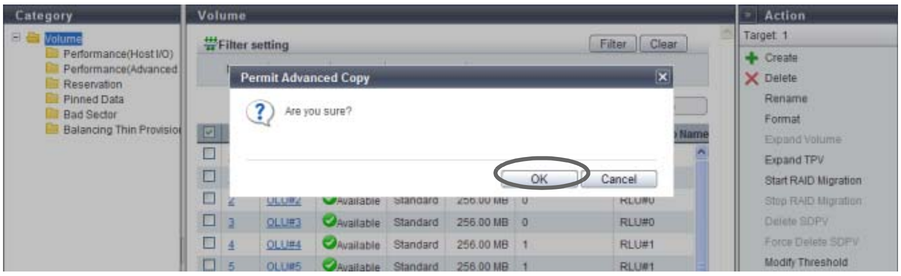
This function releases the protected volumes.
Released volumes can be used as the copy destination volume.

The procedure to release a volume protection is as follows:

Procedure

1 Select the protected volume to be released (multiple selections can be made) and click [Permit Advanced Copy] in [Action].
→ A confirmation screen appears.

2 Click the [OK] button.



→ Releasing copy destination protect starts.

3 Click the [Done] button to return to the [Volume] screen.

End of procedure

5.2.18 Modify Cache Parameters

This function changes the cache parameters of each volume.
Performance of the storage system varies depending on the cache hit ratio. The ETERNUS DX Disk storage system detects sequentiality when a host requests Read/Write. If sequentiality is detected when a Read request is issued, the cache hit ratio is improved by reading the sequential data into the cache memory in advance. The characteristics of Read/Write requests from the host depends on the system. Performance of the storage system may improve by specifying a cache parameter that is suitable for the system that is being used.

The following parameters can be specified:

- Cache Page Capacity
  Specify the cache capacity that is used by volumes.
- Prefetch Limit (PL)
  Specify the value to calculate the amount of data that is to be read from the drive in advance (amount of data to prefetch from the disk) when the cache detects the sequentiality of data access (Read IO).
- Force Prefetch Mode (FP)
  Specify whether to perform prefetch even if the sequentiality of data access (Read IO) is not detected.

- Multi Writeback Count (MWC)
  Specify the number of processes that can be written back at the same time.
- Prefetch Sequential Detect Count (PSDC)
  Specify the number of times for sequential data detection to determine the sequentiality of data access (Read IO).
- Sequential Dirty Detect Count (SDDC)
  Specify the number of times for sequential data detection to determine the sequentiality of data access (Write I/O).
- Sequential Slope (SS)
  A parameter to determine the sequentiality of data access (Read I/O). Specify the number of LBAs by which the previous I/O and the current I/O are considered as sequential data.
- Sequential Dirty Slope (SDS)
  A parameter to determine the sequentiality of data access (Write I/O). Specify the number of LBAs by which the previous I/O and the current I/O are considered as sequential data.

Caution

- For TPVs, specify the MWC for each TPP. Refer to "7.2.8 Modify Cache Parameters (Thin Provisioning Pool)" (page 241) for details.
- Cache parameters cannot be changed when pinned data exists in the ETERNUS DX Disk storage system.

Note

The same cache parameter can be applied for multiple volumes in a single operation.

The procedure to modify cache parameters is as follows:

Procedure

1 Select which volume to change the cache parameters for (multiple selections can be made) and click [Modify Cache Parameters] in [Action].

2 Change the cache parameters and click the [Modify] button.

Refer to " Volume types for which Cache Parameters are available" (page 153) for the volume types for which the parameters can be specified.

- Cache Page Capacity
  Specify the cache capacity that is used by volumes.
  - "-" (hyphen)
  - 32.50 MB
  - 65.00 MB
  - 130.00 MB
  - 260.00 MB
  - 520.00 MB
  - 1040.00 MB
  - 2080.00 MB (Not available for the ETERNUS DX80 S2)

When "-" (hyphen) is selected, the cache capacity is not limited. It is not necessary to change the default setting for normal use. If multiple volumes with different settings are selected and [Modify Cache Parameters] is clicked, a "-" (hyphen) is displayed for the field.
Data in low I/O load volumes may not be stored in the cache memory if volumes with a high I/O load exist. This reduces the cache hit ratio for the low I/O load volumes. By limiting the cache capacity that is used by high I/O load volumes, a reduction in performance when low I/O load volumes are accessed can be prevented. However, the cache hit ratio for high I/O load volumes is lowered and the access performance for the volumes may reduced.

Caution

- Note that this parameter is not used to specify the capacity of dedicated cache for the relevant volume. This parameter limits the cache capacity that can be used for the relevant volume. Although a volume with this parameter cannot use a cache memory that exceeds the specified value, other volumes can use the entire cache, which includes the specified capacity.
- The cache page capacity must be changed when the I/O load of the volume is low.
- When selecting volumes that cannot use this parameter as the target of this function, the "Cache Page Capacity" setting is not displayed on the screen.
- If write data exceeds the specified cache page capacity for a volume that is stored in the cache memory, the cache page capacity cannot be changed.
- The cache page capacity cannot be changed for concatenated volumes that are created by the LUN concatenation function.
- For the ETERNUS DX80 S2, "2080.00 MB" cannot be selected as the cache page capacity.
- The specified cache page capacity includes the mirror area. Note that the maximum cache capacity used by read I/O is a half the specified value.
- When the cache page capacity is limited, the capacity cannot be expanded for the relevant volume. Reset the cache page capacity to the default value before expanding the volume capacity.

- Prefetch Limit (PL)
  Specify the Prefetch Limit of the volume between "0" and "64". The default value is "8".
  If "0" is specified for the "Prefetch Limit (PL)", data prefetch is not performed. It is not necessary to change the default setting for normal use. If multiple volumes with different settings are selected and [Modify Cache Parameters] is clicked, the field is blank.
  When specifying a larger "Prefetch Limit", the amount of data that is read from a disk for a single read process is increased. As a result, the number of times that data needs to be read (Staging) from the disk is reduced. However, the amount of data that is read from the disk for a single read process increases and requested data may not be read before the next read or write request from the host is issued. In this case, the waiting time for Staging may increase.
- Force Prefetch Mode (FP)
  Select whether to enable ("ON") or disable ("OFF") the Force Prefetch Mode to forcibly read to the cache. The default setting is "OFF". It is not necessary to change the default setting for normal use. If multiple volumes with different settings are selected and [Modify Cache Parameters] is clicked, "OFF" is selected for the field.
  This setting is required to improve the sequential read access performance.
  When a number of sequential accesses are performed for one volume, the ETERNUS DX Disk storage system may determine that random accesses have occurred. By selecting "ON" for "Force Prefetch Mode", prefetching is forcibly performed in such a case.
  However, for random read access, unnecessary data is read from the disk and random read access performance may be reduced.

- Multi Writeback Count (MWC)
  Specify the Multi Writeback Count between "1" and "16". It is not necessary to change the default setting for normal use. If multiple volumes with different settings are selected and [Modify Cache Parameters] is clicked, the field is blank.
  The Multi Writeback Count cannot be specified for volumes that are concatenated by the LUN concatenation function.
  When specifying a larger "Multi Writeback Count" value, sequential write access performance is improved. Note that this is not effective when a number of random write accesses occur. Depending on the ratio of read access and write access, read access performance may be reduced.
- Prefetch Sequential Detect Count (PSDC)
  Specify the Prefetch Sequential Detect Count between "1" and "255". The default value is "3". It is not necessary to change the default setting for normal use. If multiple volumes with different settings are selected and [Modify Cache Parameters] is clicked, the field is blank.
  If the host splits data into multiple pieces and performs read access in succession, the access may be determined as sequential access even if it is actually random access. When specifying a larger "Prefetch Sequential Detect Count", the required number to detect sequential data for determining sequential data access is increased and a reduction in performance due to incorrect prefetch can be avoided. Depending on the amount of sequential data, a high PSDC value slows the determination of sequential data access and performance may be reduced.
- Sequential Dirty Detect Count (SDDC)
  Specify the value of the Sequential Dirty Detect Count between "1" and "255". The default value is "3". It is not necessary to change the default setting for normal use. If multiple volumes with different settings are selected and [Modify Cache Parameters] is clicked, the field is blank.
  If the host splits data into multiple pieces and performs write access in succession, the access may be determined as sequential access even if it is actually random access. When specifying larger "Sequential Dirty Detect Count", the required number to detect sequential data for determining sequential data access is increased and a reduction in performance due to incorrect prefetch can be avoided.
  Depending on the amount of sequential data, a high SDDC value slows the determination of sequential data access and performance may be reduced.
- Sequential Slope (SS)
  Specify the value of the Sequential Slope between "0" and "4096". If the following equation is true for sequential data access (Read I/O), the access is determined as sequential access. The default value is "0". It is not necessary to change the default setting for normal use. If multiple volumes with different settings are selected and [Modify Cache Parameters] is clicked, the field is blank.

(End LBA of the previous I/O + 1) + SS (Sequential Slope) ⊇ Start LBA of the current I/O

  The following can be also determined as sequential access.
  - A sequential access that does not have successive Logical Block Addresses (LBAs) and skips some addresses
  - A sequential access that issues multiple host I/Os at the same time and is unable to be received in the order of LBAs

  A high SS value may cause random access to be determined as sequential access, resulting in reduced performance due to incorrect prefetching.
- Sequential Dirty Slope (SDS)
  Specify the value of the Sequential Dirty Slope between "0" and "4096". If the following equation is true for sequential data access (Write I/O), the access is determined as sequential access. The default value is "0". It is not necessary to change the default setting for normal use.
  If multiple volumes with different settings are selected and [Modify Cache Parameters] is clicked, the field is blank.

(End LBA of the previous I/O + 1) + SDS (Sequential Dirty Slope) ⊇ Start LBA of the current I/O

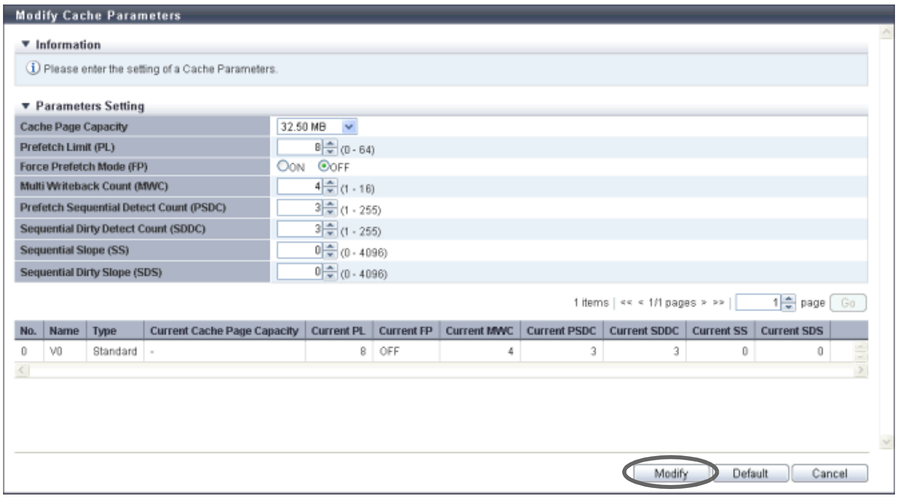
The following can be also determined as sequential access:

- A sequential access that does not have successive LBAs and skips some addresses
- A sequential access that issues multiple host I/Os at the same time and is unable to be received in the order of LBAs

A larger SDS may cause random access to be determined as sequential access, resulting in reduced performance due to incorrect prefetching.

Note

The setting values that are available for Multi Writeback Count vary depending on the RAID type and drive configuration. Refer to "E.2 Input Conditions for MWC" (page 1007) for details.

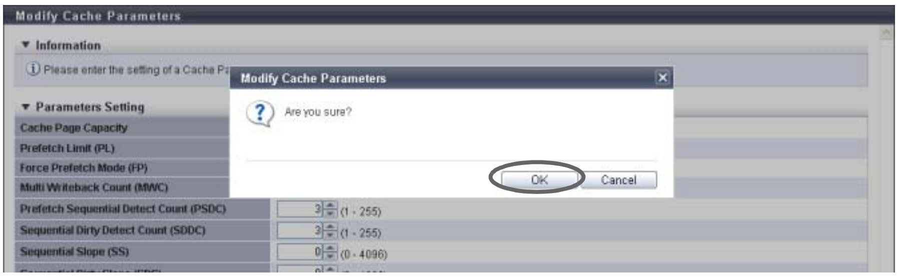


→ A confirmation screen appears.

Note

If the [Default] button is clicked before the [Modify] button, the default cache parameters are restored.

3 Click the [OK] button.



→ The cache parameter modification starts.

4 Click the [Done] button to return to the screen when starting this function in Step 1.

End of procedure

Volume types for which Cache Parameters are available

Item	Volume type						
	Standard	SDV	SDPV	Standard (LUN concatenation)	TPV	FTV	WSV
Cache Page Capacity	Available	Available	Available	N/A	N/A	N/A	N/A
Prefetch Limit (PL)	Available	Available	Available	Available	Available	N/A	Available
Force Prefetch Mode (FP)	Available	Available	Available	Available	Available	N/A	Available
Multi Writeback Count (MWC)	Available	Available	Available	N/A	(*1)	N/A	Available
Prefetch Sequential Detect Count (PSDC)	Available	Available	Available	Available	Available	N/A	Available
Sequential Dirty Detect Count (SDDC)	Available	Available	Available	Available	Available	N/A	Available
Sequential Slope (SS)	Available	Available	Available	Available	Available	N/A	Available
Sequential Dirty Slope (SDS)	Available	Available	Available	Available	Available	N/A	Available

Available: The parameter can be specified.
N/A: The parameter cannot be specified.

*1: The cache parameter is specified for each TPP. Refer to "7.2.8 Modify Cache Parameters (Thin Provisioning Pool)" (page 241) for details.

5.2.19 Export Cache Parameters

This function downloads the setting information of the cache parameters for all the volumes at the same time.

Note

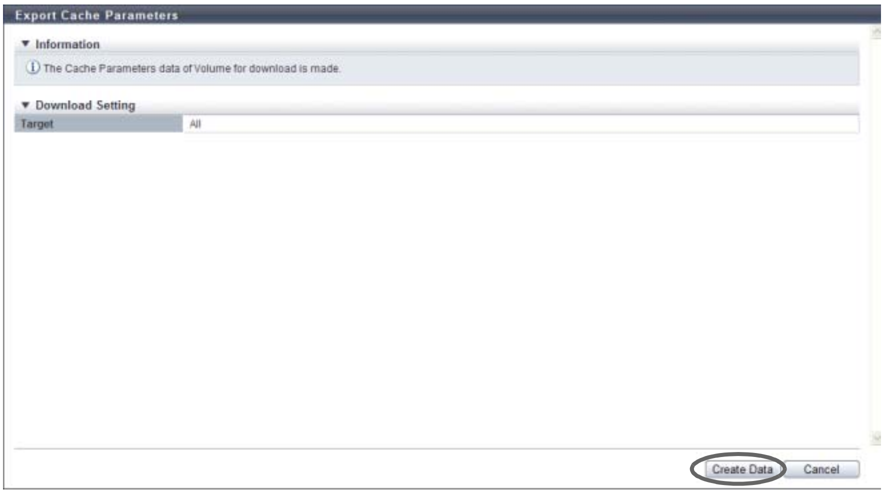
- "Cache Page Capacity", "Prefetch Limit (PL)", "Force Prefetch Mode (FP)", "Multi Writeback Count (MWC)", "Prefetch Sequential Detect Count (PSDC)", "Sequential Dirty Detect Count (SDDC)", "Sequential Slope (SS)", and "Sequential Dirty Slope (SDS)" can be downloaded as cache parameters.
- Cache parameters can be downloaded from "Standard", "WSV", "TPV", "FTV", "SDV", and "SDPV" type volumes. Note that "Cache Page Capacity" cannot be downloaded from "WSV", "TPV", and "FTV" type volumes.
- "MWC" for each TPP can be downloaded.

The procedure to export cache parameters is as follows:

Procedure

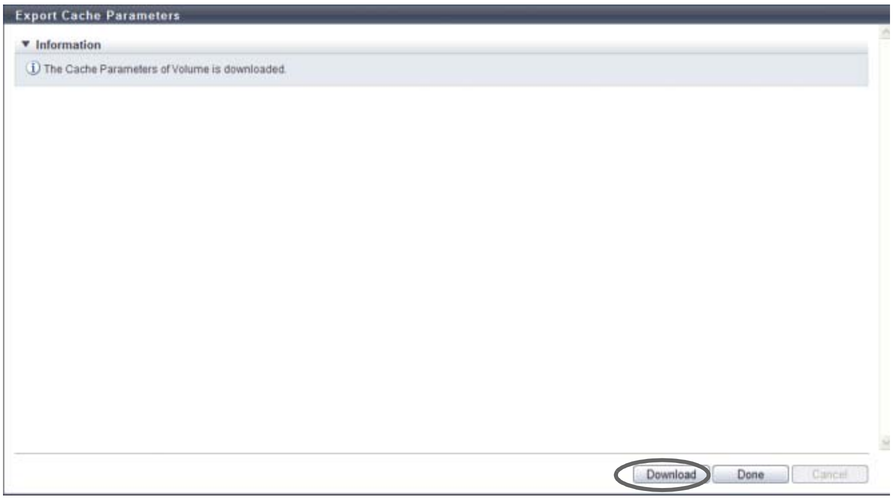
1 Click [Export Cache Parameters] in [Action].

2 Click the [Create Data] button.



→ Exporting of the cache parameters is executed.
After the cache parameters are exported, a dialog box to download the file appears.

3 Click the [Download] button.



→ A dialog box to download the file appears.

4 Save the setting information file of the cache parameter.

The default file name is "CacheParam_serial number for the ETERNUS DX Disk storage system_YYYY-MM-DD_hh-mm-ss.txt".
(YYYY-MM-DD_hh-mm-ss: the date and time when the download screen (Step 3) is displayed.)
→ The cache parameter download starts.

5 Click the [Done] button to return to the screen when starting this function in Step 1.

End of procedure

5.2.20 Export Performance Information

This function exports the following performance information in a single operation and saves it as a text file.

- Performance (Host I/O)
- Performance (Advanced Copy)
- Performance (CA)
- Performance (CM)
- Performance (Drive)

Note

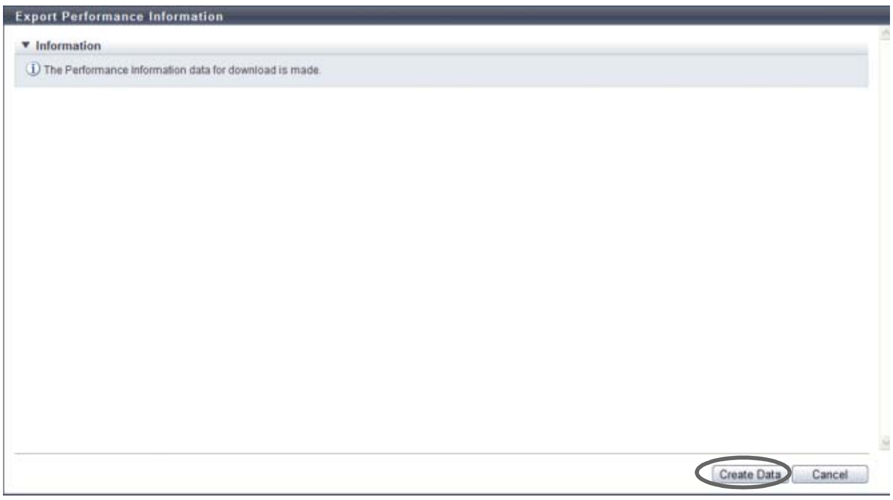
- "Performance (Host I/O)" is the performance information of volumes for Host I/O.
- "Performance (Advanced Copy)" is the performance information of volumes for Advanced Copy.
- The target CA for exporting information of "Performance (CA)" is FC, iSCSI, FCoE, and SAS (for ETERNUS DX80 S2/DX90 S2). Note that performance information for FC port which port mode is "Initiator" cannot be obtained.

The procedure to download the performance information is as follows:

Procedure

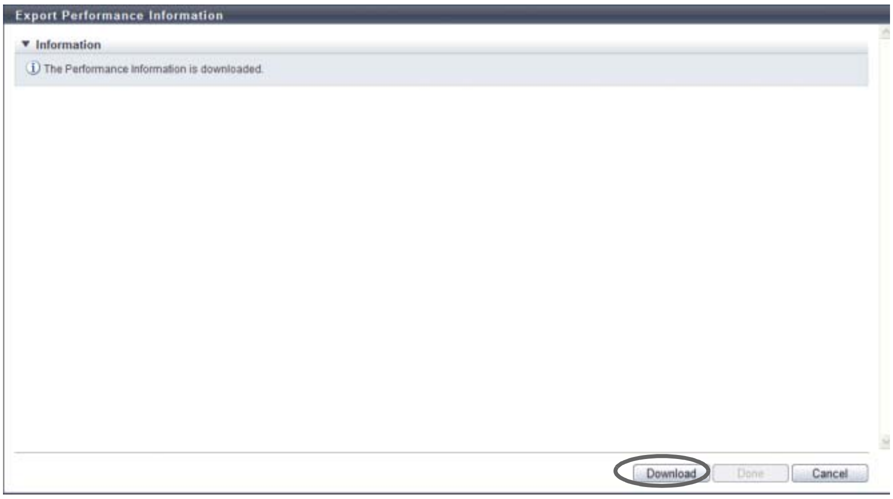
1 Click [Export Performance Info] in [Action].

2 Click the [Create Data] button.



→ The registered performance information in the ETERNUS DX Disk storage system is exported.
After the performance information export is finished, a screen to execute downloading the file is displayed.

3 Click the [Download] button.



→ A dialog box to download the file appears.

4 Save the downloaded performance information file.

The default file name is "Perform_serial number for the ETERNUS DX Disk storage system_YYYY-MM-DD_hh-mm-ss.txt".
(YYYY-MM-DD_hh-mm-ss: the date and time when the download screen (Step 3) is displayed.)
→ Downloading the performance information file starts.

5 Click the [Done] button to return to the screen when starting this function in Step 1.

End of procedure

5.2.21 Release Reservation

This function releases the reservation status of volumes that are specified by the host.
Reservation and release reservation of a volume is normally performed from the host. This function must be used only when a reservation of a volume cannot be released due to errors in the host.
This function provides the following features:

- Releasing the volume reservation status
- Releasing the volume persistent reservation status
- Deleting all the reservation keys that are registered in the ETERNUS DX Disk storage system

Caution

Be sure to pay attention when releasing reserve status as it may cause data corruption. Check the status of the target volume before using this function.

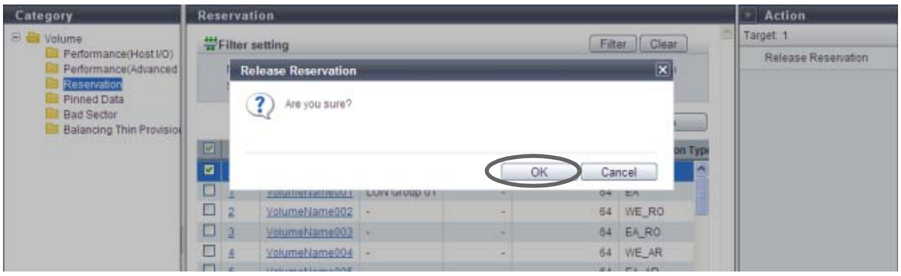
The procedure to release the reservation status is as follows:

Procedure

1 Select the volumes to release the reservation (multiple selections can be made), and click [Release Reservation] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ Releasing volume reservation status starts.

3 Click the [Done] button to return to the [Volume] screen.

End of procedure

5.2.22 Start Balancing Thin Provisioning Volume

This function relocates the physical allocating area of the TPV to make the physical area of TPV is allocated equally among the RAID Groups that configure the TPP.
When multiple TPVs in the same TPP are accessed, the physical area is allocated by using the RAID groups of the TPP one by one in the access order. Therefore the physical area of TPVs may be unequally allocated among the RAID groups. This phenomenon also occurs when expanding the capacity of a TPP. In this case, the physical area is allocated unevenly among the newly added and existing RAID groups. This function is to solve the unequal allocation among RAID groups, and balance the physical allocating area in each RAID group. I/O load is dispersed among the RAID groups in the TPP and access performance may be improved.

Requirements for a TPV to be balanced:

- The "Type" is "TPV"
- The "Status" is " Available"
- RAID migration is not being performed (the target volume is not used as a migration source or a migration destination)
- An Advanced Copy is not being performed (the target volume is not being used as a copy source or a copy destination)
- A Remote Advanced Copy is not being performed (the target volume is not being used as a copy source or a copy destination)
- An Advanced Copy (ODX) is not being performed
- TPV balancing is not being performed
- Zero Reclamation is not being performed

Requirements for a TPP in which the target TPV is registered:

- The "Status" is "✓ Available"
- The free space in the TPP is larger than the capacity of the TPV that is to be balanced

Caution

- If a Thin Provisioning license is not registered, this function cannot be used.
- The TPV balancing cannot be performed in the following conditions:
  - When the maximum number of volumes is already registered in the ETERNUS DX Disk storage system
  - When the total number of TPV balancing, RAID migration, and FTV balancing (*1) processes that are performed at the same time is 32
  - When the total capacity for the TPV balancing, RAID migration, and FTV balancing (*1) processes that are performed at the same time is 128TB
  - When the TPP capacity that can be registered in the ETERNUS DX Disk storage system is insufficient

  *1: When the FTRP balancing is performed, the FTV balancing process starts in the FTSP. Refer to "7.2.12 Start Balancing Flexible Tier Pool" (page 248) for details.
- This function balances the physical allocating area of the TPV among RAID groups of the TPP to which the TPV belongs. It is not able to balance TPV by RAID migration of the TPV to other TPPs.

Note

- TPV balancing can be performed during the work I/O.
- To check the balancing progress of a TPV, refer to "5.1.8 Balancing Thin Provisioning Volume" (page 86).

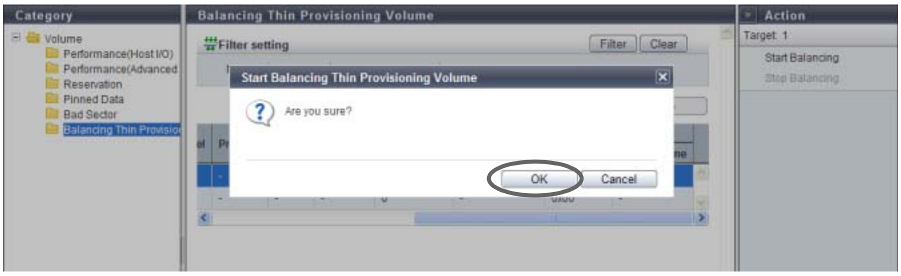
The procedure to start balancing TPVs is as follows:

Procedure

1 Select the TPV to be balanced and click [Start Balancing] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ TPV balancing starts.

3 Click the [Done] button to return to the [Balancing Thin Provisioning Volume] screen.

End of procedure

5.2.23 Stop Balancing Thin Provisioning Volume

This function stops TPV balancing

Caution

- This function cannot be used when balancing is not being performed for a TPV.
- This function cannot be used when the specified TPV balancing is already complete.

Note

When TPV balancing is stopped, data in volumes that are not balanced yet can be accessed normally.

The procedure to stop balancing of the Thin Provisioning Volume is as follows:

Procedure

1 Select the volume for which balancing is to be stopped and click [Stop Balancing] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ TPV balancing stops.

3 Click the [Done] button to return to the [Balancing Thin Provisioning Volume] screen.

End of procedure

Chapter 6
RAID Group Management

This chapter describes RAID group management.

6.1 RAID Group Status

RAID group status displays the status information of volumes.
RAID group status screens can be displayed by clicking the following categories:

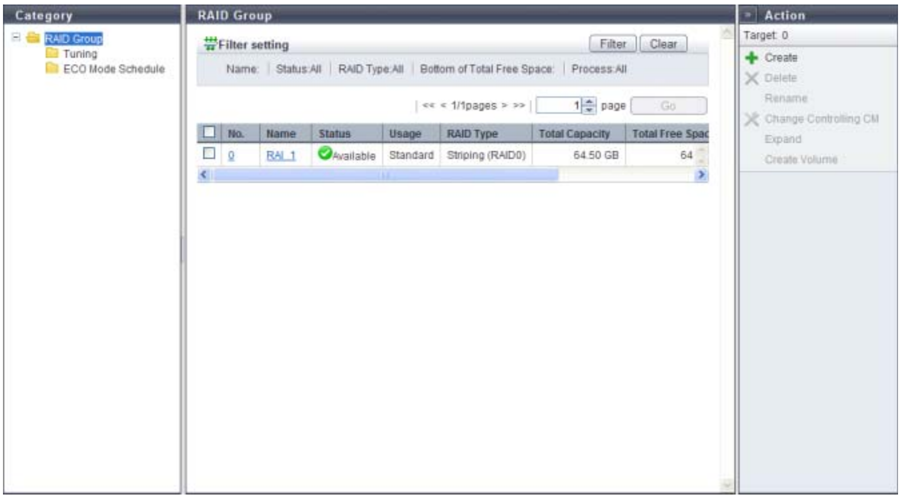
RAID group status screen	Category
RAID Group (Basic Information)	RAID Group
Tuning	Tuning
ECO Mode Schedule (RAID Group)	ECO Mode Schedule
SED Key Group	SED Key Group

Detailed information of the RAID groups can be displayed from the following screens:

- RAID Group (Basic)
- RAID Group (Volume Layout)
- RAID Group Detail (Disk)

6.1.1 RAID Group (Basic Information)

This function displays the basic information of RAID groups.



The following items are displayed in the Main area:

- No.
  The RAID group number is displayed. Click this item to display "6.1.5 RAID Group (Basic)" (page 169).
  The RAID group number is allocated when a volume is created from the smallest unused decimal number in ascending order.
- Name
  The RAID group name is displayed. Click this item to display "6.1.5 RAID Group (Basic)" (page 169).
- Status
  The RAID group status is displayed. Refer to "B.3 RAID Group Status" (page 975) for detailed information of RAID group status.
- Usage
  The usage of the RAID group is displayed.
  - Standard
    A RAID group that is used for creating "Standard", "SDV", or "SDPV" type volumes
  - Standard / WSV
    A RAID group that is used for creating "Standard", "WSV", "SDV", or "SDPV" type volumes
  - WSV
    A RAID group that is used for creating "WSV" type volumes
  - TPP
    A RAID group that belongs to a TPP
  - FTRP
    A RAID group that belongs to a Flexible Tier Pool (FTRP)
  - RDB
    A RAID group that is registered as an REC Disk Buffer
  - Temporary
    A RAID group that is temporarily created while LDE is being performed
  - "-" (hyphen)
    A RAID group that is not used

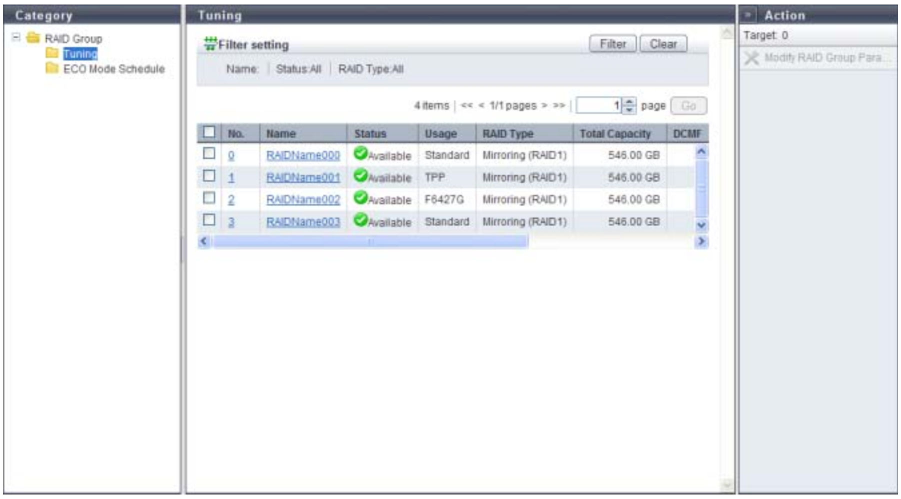
- RAID Type
  The type of RAID group is displayed.
  - High Performance (RAID1+0)
  - High Capacity (RAID5)
  - High Reliability (RAID6)
  - Reliability (RAID5+0)
  - Mirroring (RAID1)
  - Striping (RAID0)
- Total Capacity
  The total capacity of the RAID groups is displayed.
  The capacity is displayed in units of "GB" or "TB". Even when volumes are created in units of "GB", if the volume capacity exceeds 1023.99GB, the capacity is displayed in units of "TB". The capacity is rounded off to two decimal places.
- Total Free Space
  The total free space in the RAID group is displayed.
  If the total free capacity exceeds 1023.99MB, the capacity is displayed in units of "GB". If the total free capacity exceeds 1023.99GB, the capacity is displayed in units of "TB". The capacity is rounded off to two decimal places.
  "Free space" means an area in the RAID group where no volume is created, and dispersed areas which became free by creating and deleting a volume.
- Controlling CM
  The controlling CM and CPU of the RAID group are displayed.
  - CM#x CPU#y (x: CM number, y: CPU number)
- Process
  A process that is being performed for the RAID group is displayed. If no process is being performed, a "-" (hyphen) is displayed.
  - Recovering
    Rebuild, copyback, redundant copy, or RAID group recovery is being performed.
  - Expanding
    Expansion of the RAID group by LDE is being performed.
  - Formatting
    Formatting of the RAID group is being performed.

Filter setting

Filter	Description
Name	Input the RAID group name that is to be displayed. When not using the RAID group name for filtering, leave this item blank.
Status	Select the RAID group status that is to be displayed.
RAID Type	Select the RAID type that is to be displayed.
Bottom of Total Free Space	Input the minimum capacity of unused free space for the RAID groups that are to be displayed and select the units of capacity. When the minimum free space of the RAID group is not used for filtering, specify "0MB".
Process	Select which current process for the RAID group is to be displayed.

6.1.2 Tuning

The RAID group tuning information is displayed.



The following items are displayed in the Main area:

- No.
  The RAID group number is displayed. Click this item to display "6.1.5 RAID Group (Basic)" (page 169).
- Name
  The RAID group name is displayed. Click this item to display "6.1.5 RAID Group (Basic)" (page 169).
- Status
  The RAID group status is displayed. Refer to "B.3 RAID Group Status" (page 975) for detailed information of RAID group status.
- Usage
  The usage of the RAID group is displayed.
  - Standard
    A RAID group that is used for creating "Standard", "SDV", or "SDPV" type volumes
  - Standard / WSV
    A RAID group that is used for creating "Standard", "WSV", "SDV", or "SDPV" type volumes
  - WSV
    A RAID group that is used for creating "WSV" type volumes
  - TPP
    A RAID group that belongs to a TPP
  - FTRP
    A RAID group that belongs to an FTRP
  - RDB
    A RAID group that is registered as an REC Disk Buffer
  - "-" (hyphen)
    A RAID group that is not used

- RAID Type
  The type of RAID group is displayed.
  - High Performance (RAID1+0)
  - High Capacity (RAID5)
  - High Reliability (RAID6)
  - Reliability (RAID5+0)
  - Mirroring (RAID1)
  - Striping (RAID0)
- Total Capacity
  The total capacity of the RAID groups is displayed.
- DCMF
  The Drive Command Multiplying Factor (DCMF) is displayed.
  If the DCMF is changed, the number of commands issued to the drive is increased in multiples of the DCMF set value (if DCMF is "2", it is double).
- Rebuild Priority
  The rebuild priority of the RAID group is displayed.
  When the Rebuild Priority is "Low", give priority to host access.
  When the Rebuild Priority is "Middle", give the same priority as the host access to rebuild, copyback, and redundant copy.
  When the Rebuild Priority is "High", give priority to rebuild, copyback, and redundant copy.
- Throttle
  The throttle value is displayed.
  Throttle is the proportion of the number of commands that are issued to a drive at the same time to the maximum number of commands that can be issued. When the throttle value is "100%", the maximum number of commands specified for each drive (the default number of commands) are issued.
  When "Disk Tuning Parameter Setting" of the [Modify RAID Group Parameters] function is disabled, a "-" (hyphen) is displayed.
  When logged in with a user account that has a default "Monitor" role, this item is not displayed.
- Ordered Cut
  Ordered Cut is displayed between 0 and 65535.
  Ordered Cut is the number of commands for optimizing drive access processing (priority control). When Ordered Cut is "x", the command to perform the priority control is issued for every x commands issued, and priority control is performed for the command issued before this command.
  When Ordered Cut is "0", the interval for priority control (priority control at every "x" commands") cannot be specified. All of the commands issued to the drive are processed according to their priority settings.
  When "Disk Tuning Parameter Setting" of the [Modify RAID Group Parameters] function is disabled, or the configuration drive of the RAID group is SSD, a "-" (hyphen) is displayed.
  When logged in with a user account that has a default "Monitor" role, this item is not displayed.

Caution

RAID groups in which LDE is being performed are not displayed in the list.

Filter setting

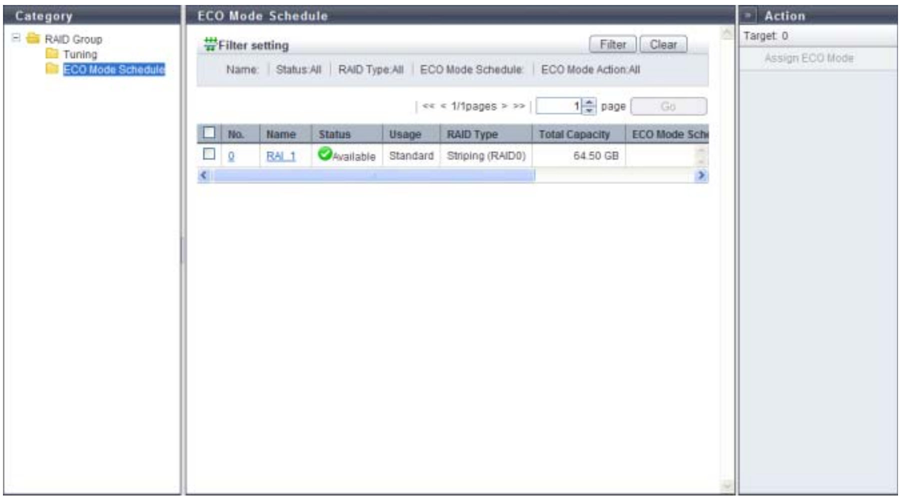
Filter	Description
Name	Input the RAID group name that is to be displayed. When not using the RAID group name for filtering, leave this item blank.
Status	Select the RAID group status that is to be displayed.
RAID Type	Select the RAID type that is to be displayed.

6.1.3 ECO Mode Schedule (RAID Group)

This function displays the setting status of the ECO mode that is applied for the RAID group.

Note

- To use the ECO mode, follow the procedure in "11.2.8.1 Modify ECO Mode General Setting" (page 869) and "11.2.8.2 Create ECO Mode Schedule" (page 871) to perform the general ECO mode setup and create an ECO mode schedule.
- To assign the ECO mode to a RAID group, refer to "6.2.7 Assign ECO Mode Schedule (RAID Group)" (page 192).



The following items are displayed in the Main area:

- No.
  The RAID group number is displayed. Click this item to display "6.1.5 RAID Group (Basic)" (page 169).
- Name
  The RAID group name is displayed. Click this item to display "6.1.5 RAID Group (Basic)" (page 169).
- Status
  The RAID group status is displayed. Refer to "B.3 RAID Group Status" (page 975) for detailed information of RAID group status.

- Usage
  The usage of the RAID group is displayed.
  - Standard
    A RAID group that is used for creating "Standard", "SDV", or "SDPV" type volumes
  - Standard / WSV
    A RAID group that is used for creating "Standard", "WSV", "SDV", or "SDPV" type volumes
  - WSV
    A RAID group that is used for creating "WSV" type volumes
- RAID Type
  The type of RAID group is displayed.
  - High Performance (RAID1+0)
  - High Capacity (RAID5)
  - High Reliability (RAID6)
  - Reliability (RAID5+0)
  - Mirroring (RAID1)
  - Striping (RAID0)
- Total Capacity
  The total capacity of the RAID groups is displayed.
- ECO Mode Schedule
  The ECO mode schedule name that is applied for the RAID group is displayed. When the ECO mode schedule is not applied, the field is blank.
- ECO Mode Action
  When the ECO mode is enabled, "ON" is displayed. When the ECO mode is disabled, "OFF" is displayed.
- Motor Status
  The disk motor status for the RAID group is displayed.
  - Active
    The disk motors are activated.
  - In the Boot Process
    The disk motors are starting up.
  - Idle
    The disk motors are stopped.
  - In the Stop Process
    The disk motors are being stopped.

Filter setting

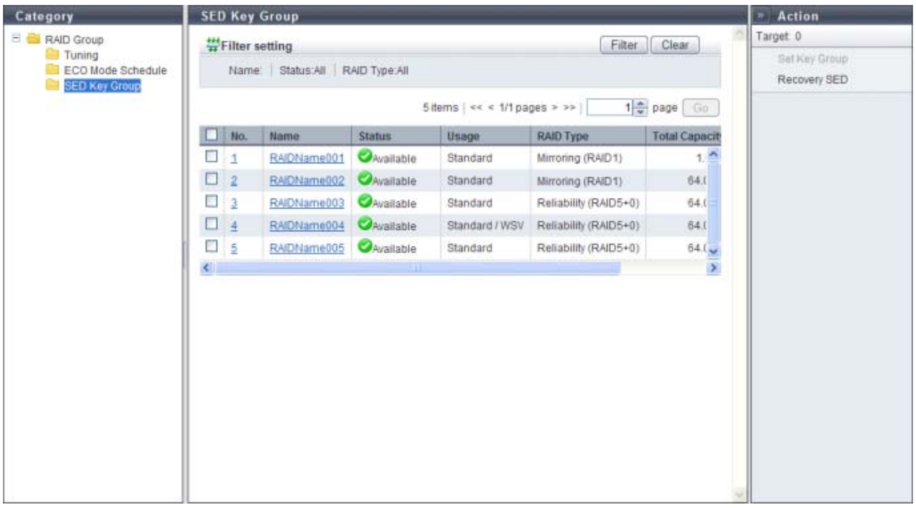
Filter	Description
Name	Input the RAID group name that is to be displayed. When not using the RAID group name for filtering, leave this item blank.
Status	Select the RAID group status that is to be displayed.
RAID Type	Select the RAID type that is to be displayed.
ECO Mode Schedule	Input the ECO mode schedule name that is applied to the RAID group that is to be displayed. When not using the ECO mode schedule name for filtering, leave this item blank.
ECO Mode Action	Select the operating status of the ECO mode that is applied to the RAID group status that is to be displayed.

6.1.4 SED Key Group

This function displays the key group settings for the RAID groups that are configured with SEDs.
The key group combines all of the RAID groups that use the same SED authentication key.

Note

- One key group can be created in the ETERNUS DX Disk storage system.
- Use the [Key Group] screen to check the SED authentication key information and the SSL/KMIP certificate information that is used for the key group. Refer to "11.1.5.1 Key Group" (page 723) for details.
- There are two types of SED keys: an SED authentication key that is managed by the key server and a common key that is stored in the ETERNUS DX Disk storage system. If a RAID group that is configured with SEDs is registered in the key group, the relevant RAID group is managed by the SED authentication key. If the RAID group is not registered in the key group, the relevant RAID group is managed by the common key.
- RAID groups that are configured with SEDs can be added in the key group or deleted from the key group. Refer to "6.2.8 Set Key Group (RAID Group)" (page 195) for details.



The following items are displayed in the Main area:

- No.
  The RAID group number is displayed. Click this item to display "6.1.5 RAID Group (Basic)" (page 169).
- Name
  The RAID group name is displayed. Click this item to display "6.1.5 RAID Group (Basic)" (page 169).
- Status
  The RAID group status is displayed. Refer to "B.3 RAID Group Status" (page 975) for detailed information of RAID group status.

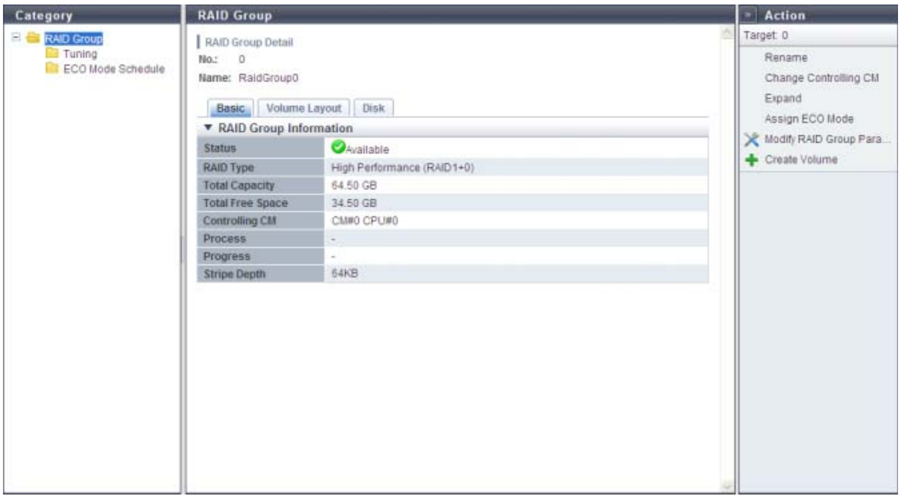
- Usage
  The usage of the RAID group is displayed.
  - Standard
    A RAID group that is used for creating "Standard", "SDV", or "SDPV" type volumes
  - Standard / WSV
    A RAID group that is used for creating "Standard", "WSV", "SDV", or "SDPV" type volumes
  - WSV
    A RAID group that is used for creating "WSV" type volumes
  - Temporary
    A RAID group that is temporarily created while LDE is being performed
  - "-" (hyphen)
    A RAID group that is not used
- RAID Type
  The type of RAID group is displayed.
  - High Performance (RAID1+0)
  - High Capacity (RAID5)
  - High Reliability (RAID6)
  - Reliability (RAID5+0)
  - Mirroring (RAID1)
  - Striping (RAID0)
- Total Capacity
  The total capacity of the RAID groups is displayed.
- Key Group
  The setting status of the key group for the RAID groups is displayed.
  - If the relevant RAID group is registered in the key group: "Enable"
  - If one of the following conditions applies to the relevant RAID group: "Disable"
    - No common key for SEDs is registered
    - The relevant RAID group is not registered in the key group

Filter setting

Filter	Description
Name	Input the RAID group name that is to be displayed. When not using the RAID group name for filtering, leave this item blank.
Status	Select the RAID group status that is to be displayed.
RAID Type	Select the RAID type that is to be displayed.

6.1.5 RAID Group (Basic)

Click the [No.] link or the [Name] link in the "6.1.1 RAID Group (Basic Information)" (page 161) to display the detailed information of the target RAID group.



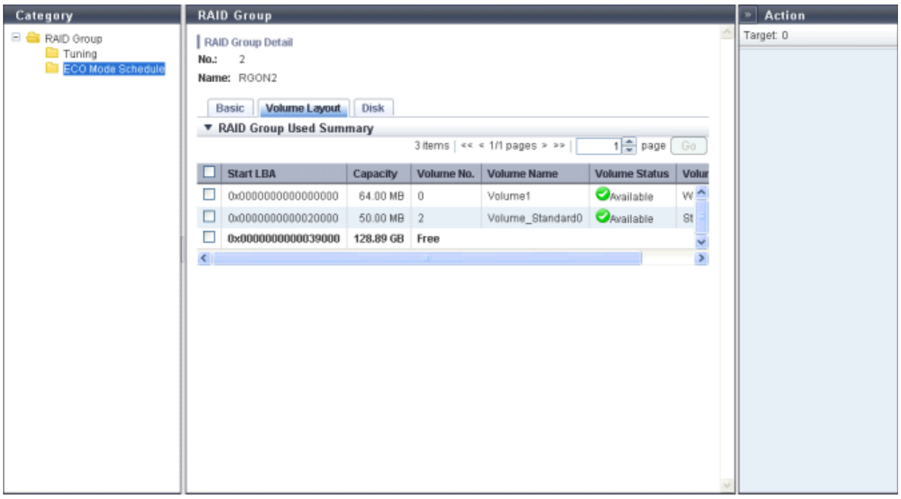
The following items are displayed in the Main area:

- Status
  The RAID group status is displayed. Refer to "B.3 RAID Group Status" (page 975) for detailed information of RAID group status.
- RAID Type
  The type of RAID group is displayed.
  - High Performance (RAID1+0)
  - High Capacity (RAID5)
  - High Reliability (RAID6)
  - Reliability (RAID5+0)
  - Mirroring (RAID1)
  - Striping (RAID0)
- Total Capacity
  The total capacity of the RAID groups is displayed.
- Total Free Space
  The total free space in the RAID group is displayed.
  "Free space" means an area in the RAID group where no volume is created, and dispersed areas which became free by creating and deleting a volume.
- Controlling CM
  The controlling CM and CPU of the RAID group is displayed.
  - CM#x CPU#y (x: CM number, y: CPU number)
- Process
  A process that is being performed for the RAID group is displayed. If no process is being performed, a "-" (hyphen) is displayed.

- Stripe Depth
  The Stripe Depth (*1) of the RAID group is displayed.
  If the RAID type is "Mirroring (RAID1)", a "-" (hyphen) is displayed.
  *1: The number of logical blocks that are assigned to a drive for each stripe when configuring a stripe volume in a RAID group. Normally, it is 64KB.
  - 64 KB
  - 128 KB
  - 256 KB
  - 512 KB
  - 1024 KB

6.1.6 RAID Group (Volume Layout)

Detailed information of the volume layout is displayed.



The following items are displayed in the Main area:

- Start LBA
  The first Logical Block Address (LBA) of the volume is displayed.

- Capacity
  The volume capacity is displayed.
  If the volume capacity exceeds 1023.99MB, the capacity is displayed in units of "GB". If the volume capacity exceeds 1023.99GB, the capacity is displayed in units of "TB". The capacity is rounded off to two decimal places. To check the volume capacity in units of "MB", use CLI.

- Volume No.
  The volume number is displayed. Unused space is displayed as "Free".

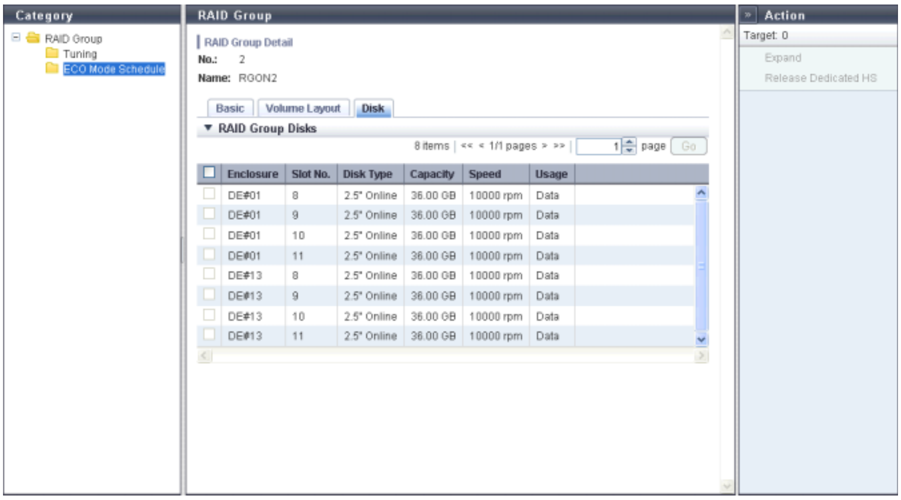
- Volume Name
  The volume name is displayed.

- Volume Status
  The volume status is displayed. Refer to "B.2 Volume Status" (page 974) for detailed information of volume status.

- Volume Type
  The volume type is displayed.
  - Standard
  - WSV
  - SDV
  - SDPV

6.1.7 RAID Group Detail (Disk)

Detailed information of disks that configure the RAID group is displayed.



The following items are displayed in the Main area:

- Enclosure
  The number of the enclosure where the drive is installed is displayed.
- Slot No.
  The number of the slot where the drive is installed is displayed.
- Disk Type
  The drive type is displayed.
  - 2.5" Online
    2.5-inch SAS disk
  - 3.5" Online
    3.5-inch SAS disk
  - 2.5" Nearline
    2.5-inch Nearline SAS disk
  - 3.5" Nearline
    3.5-inch Nearline SAS disk
  - 2.5" SSD
    2.5-inch SSD
  - 3.5" SSD
    3.5-inch SSD
  - 2.5" SED
    2.5-inch SED

- Capacity
  The capacity of the drive is displayed.
- Speed
  The drive speed is displayed. For SSDs, a "-" (hyphen) is displayed.
- Usage
  The usage of the drive is displayed.
  - Data
    A drive that is used for user data or an unused drives
  - Global Hot Spare
    A drive that is registered as a Global Hot Spare
  - Dedicated Hot Spare
    A drive that is registered as a Dedicated Hot Spare

6.2 Functions in the Action Area for RAID Group

When using functions in the Action area, select the desired function from the Action area that is displayed in the status display screen.
The functions in the Action area for RAID group can be performed from the following display functions:

Functions in the Action area for RAID Group	Display function
Create RAID Group	• RAID Group (Basic Information)
Delete RAID Group	
Rename RAID Group	
Change Controlling CM	
Expand RAID Group	
Modify RAID Group Parameters	• Tuning
Assign ECO Mode Schedule (RAID Group)	• ECO Mode Schedule (RAID Group)
Set Key Group (RAID Group)	• SED Key Group
Recovery SED	

6.2.1 Create RAID Group

This function creates RAID groups.
A RAID group is a group of drives that configure a RAID type.

Features and required number of drives for each RAID type

The following table shows the features and the required number of drives for each RAID type.
Note that "Striping (RAID0)" has no data redundancy.

RAID type	Feature	Required number of drives
High Performance (RAID1+0)	The high I/O performance of RAID0 (striping) is combined with the reliability of RAID1 (mirroring).	2D+2M – 16D+16M
High Capacity (RAID5)	Data divided into units of blocks and allocated across multiple drives together with parity information created from the data.	2D+1P – 15D+1P
High Reliability (RAID6)	The use of double parity allows the full recovery of lost data even in the event that two of the drives fail.	3D+2P – 14D+2P
Reliability (RAID5+0)	Multiple RAID5 volumes are RAID0 striped. For large capacity configurations, use of RAID5+0 instead of RAID5 results in enhanced performance, improved reliability, and shorter rebuilding times.	(2D+1P) × 2 – (15D+1P) × 2
Mirroring (RAID1)	Data is mirrored to two drives. If one drive fails, the other drive continues operation (mirroring).	1D+1M
Striping (RAID0)	Data is split in unit of blocks and stored across multiple drives (striping). RAID0 has no data redundancy.	2D – 16D

*1: D: Data drives, M: Mirror drives, P: Parity drives

The maximum number of RAID groups for each model

The maximum number of RAID groups varies depending on each model. The following table shows the maximum number of RAID groups for each model.

Model	The maximum number of RAID groups
ETERNUS DX80 S2	60
ETERNUS DX90 S2	120
ETERNUS DX410 S2	240
ETERNUS DX440 S2	480
ETERNUS DX8100 S	48
ETERNUS DX8700 S2	1536

Drive combinations that can configure a RAID group

The following table shows the drive combinations that can configure a RAID group.

	Online	Nearline	SSD
Online	OK	OK	NG
Nearline	OK	OK	NG
SSD	NG	NG	OK

Caution

- RAID groups can be created when the drives satisfy all of the following conditions:
  - The drives are not registered in any RAID group, TPP, FTRP, or REC Disk Buffer
  - The drives are not registered as hot spares
  - The "Status" is " Present"
- All drives that are selected for creating a RAID group must have the same capacity and the same speed. If drives of different capacities exist in a RAID group, the smallest capacity becomes the standard, and all other drives are regarded as having the same capacity as the smallest drive. In this case, the remaining drive space is not used. In addition, if drives of different speeds exist in a RAID group, the access performance of the RAID group is reduced by the slower drives.
- Some combinations of drive types cannot configure a RAID group. Refer to "Drive combinations that can configure a RAID group" (page 175) for details.
- If both Online disks and Nearline disks are used for a RAID group, the drives in the RAID group will have different speeds and capacity. In this case, some space cannot be used and the performance is reduced.
- "Striping (RAID0)" has no data redundancy. The use of "High Performance (RAID1+0)", "High Capacity (RAID5)", "High Reliability (RAID6)", "Reliability (RAID5+0)", or "Mirroring (RAID1)" is recommended.

There are two methods to create a volume: automatic drive selection and manual drive selection.

Automatically selecting drives to create RAID groups

The procedure to create a RAID group is as follows:

Procedure

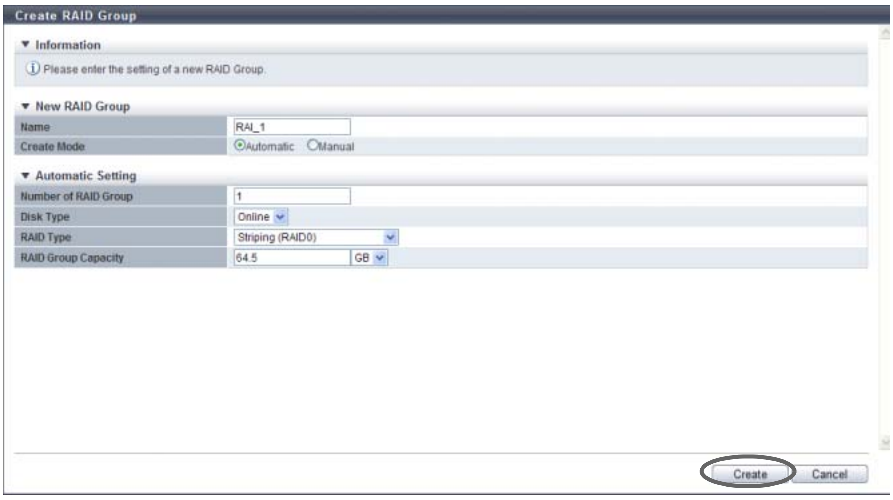
1 Click [Create] in [Action].

2 Select "Automatic" for "Create Mode".

3 Specify the RAID group detailed information, and click the [Create] button.

- Name
  Input a RAID group name that is to be created.
  An existing RAID group name cannot be used.
  The following input conditions apply:
  - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space

- Number of RAID Group
  Input the number of RAID groups that is to be created.
  When creating multiple RAID groups at a time, the new RAID groups are named automatically. Refer to "Naming conventions for creating volumes" (page 993) for details.
- Disk Type
  Select the type of drive that configures a RAID group from the list box.
  - Online
  - Nearline
  - SSD
  - SED
- RAID Type
  Select the type of RAID group that is to be created from the list box.
  - High Performance (RAID1+0)
  - High Capacity (RAID5)
  - High Reliability (RAID6)
  - Reliability (RAID5+0)
  - Mirroring (RAID1)
  - Striping (RAID0)
- RAID Group Capacity
  Input the RAID group capacity that is to be created and select the units of capacity.
  A RAID group is automatically created with a capacity of the entered value or higher.
  The following input conditions apply:
  - Numeric characters
  - TB/GB/MB

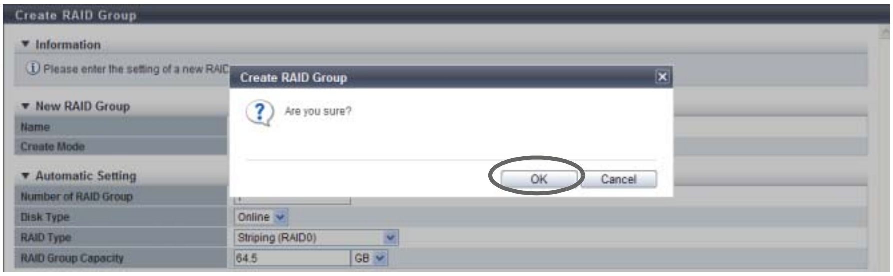


→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:
- When the "Name" overlaps with an existing RAID group name
- When the "Name" does not satisfy the input conditions
- When the RAID group that is specified using the automatic setting cannot be created with the drives that are installed in the ETERNUS DX Disk storage system

4 Click the [OK] button.



→ RAID group creation starts.

5 Click the [Done] button to return to the [RAID Group] screen.

End of procedure

Manually selecting drives to create RAID groups

Procedure

1 Click [Create] in [Action].

2 Select "Manual" for "Create Mode".

3 Specify the RAID group detailed information, and click the [Create] button.

- Name
  Input a RAID group name that is to be created.
  An existing RAID group name cannot be used.
  The following input conditions apply:
  - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space
- RAID Type
  Select the type of RAID group that is to be created from the list box.
  - High Performance (RAID1+0)
  - High Capacity (RAID5)
  - High Reliability (RAID6)
  - Reliability (RAID5+0)
  - Mirroring (RAID1)
  - Striping (RAID0)
- Controlling CM
  Select the controlling CM and CPU of the RAID group that is to be created.
  "Automatic" and the installed "CM#x CPU#y" in normal status are displayed as options.
  - Automatic
  - CM#x CPU#y (x: CM number, y: CPU number)

  Select "Automatic" for normal operations. When "Automatic" is selected, the CM-CPU that is to be assigned is determined by the RAID group number. Refer to "Appendix F Automatic Controlling CM-CPU Setting" (page 1011) for details.

- RAID Group Capacity
  The capacity of RAID group that is to be created is displayed. The "RAID Group Capacity" is automatically calculated from the selected RAID type and drives.
- Checkbox to select drives
  Select the checkbox for the drive that is to be used.
  When using the ETERNUS DX8100 S2/DX8700 S2, the restrictions that apply to the drive layout for RAID group configuration vary depending on the RAID type. Refer to "Restrictions of drive layout" (page 179) for details.

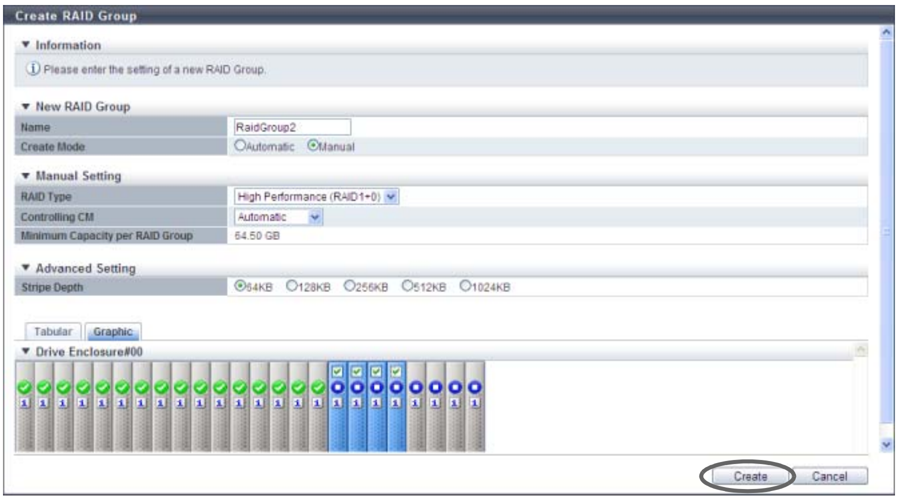
Note

Drives can be selected from the list of drives that is displayed for Tabular or from the drive images that are displayed for Graphic. Click the Tabular tab to display a list of the drives or click the Graphic tab to display drive images.

Advanced Settings

Specify the Stripe Depth only when performing the advanced performance tuning for each RAID group. It is not necessary to change the default setting for normal use.
The higher the Stripe Depth value, the lower the number of drives that access the RAID group. If "High Performance (RAID1+0)" is used, the number of commands that are issued for the drives is reduced and access performance for the relevant RAID group is improved. Note that for "High Capacity (RAID5)", a high Stripe Depth value may reduce the sequential write performance. Also note that restrictions apply for RAID groups and volumes in the RAID group for which Stripe Depth value is changed. Refer to "Restrictions for Stripe Depth modification" (page 180) for details.

- Stripe Depth
  Select the Stripe Depth of RAID group that is to be created.
  When the "RAID Type" is "Mirroring (RAID1)", this setting is not available. When the "RAID Type" is "Reliability (RAID5+0)" or "High Reliability (RAID6)", the value is fixed to "64KB". Available Stripe Depth value varies depending on the RAID type. Refer to "Available Stripe Depth value" (page 180) for details.



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When the "Name" overlaps with an existing RAID group name
- When the "Name" does not satisfy the input conditions
- When the conditions described in "Restrictions of drive layout" are not satisfied
- When an invalid Stripe Depth for the RAID type is specified

4 Click the [OK] button.



→ RAID group creation starts.

5 Click the [Done] button to return to the [RAID Group] screen.

End of procedure

Restrictions of drive layout

When using the ETERNUS DX8100 S2, the following restrictions for each RAID type apply to the drive layout for RAID group configuration. A RAID group that does not satisfy the required conditions cannot be created.

RAID Type	Selection Conditions	
High Performance (RAID1+0)	Required	Allocate mirroring pair drives to different DEs.
	Recommended	Distribute striping drives over as many DEs as possible.
High Capacity (RAID5)	Recommended	Distribute member drives over as many DEs as possible.
High Reliability (RAID6)		
Reliability (RAID5+0)	Recommended	Distribute member drives over as many DEs as possible.
Mirroring (RAID1)	Required	Allocate mirroring pair drives to different DEs.

When using the ETERNUS DX8700 S2, the following restrictions for each RAID type apply to the drive layout for RAID group configuration. A RAID group that does not satisfy the required conditions cannot be created.

RAID Type	Selection Conditions	
High Performance (RAID1+0)	Required	Allocate mirroring pair drives to different SAS cascades (*1). No restrictions are applied for BRT.
	Recommended	Distribute striping drives over as many DEs as possible.
High Capacity (RAID5)	Required	Allocate member drives to different SAS cascades. No restrictions are applied for BRT.
High Reliability (RAID6)	Required	The maximum number of member drives that can be allocated in the same SAS cascade is two. No restrictions are applied for BRT.
	Recommended	Distribute member drives over as many DEs as possible.
Reliability (RAID5+0)	Required	The maximum number of member drives that can be allocated in the same SAS cascade is two. No restrictions are applied for BRT.
	Recommended	Distribute member drives over as many DEs as possible.
Mirroring (RAID1)	Required	Allocate mirroring pair drives to different SAS cascades (*1). No restrictions are applied for BRT.

*1: The "SAS cascade" indicates the DEs that are connected to a single BRT port.
Same SAS cascade:
DE#x0, DE#x1, DE#x2, DE#x3 (x: 0 - F)
DE#x8, DE#x9, DE#xA, DE#xB (x: 0 - F)
[Example] SAS cascade for Port#0 of the BRT#0/#1: DE#00, DE#01, DE#02, DE#03
[Example] SAS cascade for Port#4 of the BRT#2/#3: DE#48, DE#49, DE#4A, DE#4B

Available Stripe Depth value

The following table shows the available Stripe Depth value for each RAID type.

RAID type	Drive configuration (*1)	Available Stripe Depth value
Mirroring (RAID1)	1D+1M	–
High Performance (RAID1+0)	Any	64KB, 128KB, 256KB, 512KB, 1024KB
Striping (RAID0)		
High Capacity (RAID5)	2D+1P – 4D+1P	64 KB, 128 KB, 256 KB, 512 KB
	5D+1P – 8D+1P	64 KB, 128 KB, 256 KB
	9D+1P – 15D+1P	64 KB, 128 KB
Reliability (RAID5+0)	Any	64 KB
High Reliability (RAID6)		

*1: D: Data drives, M: Mirror drives, P: Parity drives

Restrictions for Stripe Depth modification

The following restrictions are applied for the RAID groups and volumes in the RAID group of which Stripe Depth value is changed.

- Stripe depth for the existing RAID group cannot be changed.
- When selecting drives automatically to create a RAID group, the Stripe Depth cannot be changed.
- Capacity expansion (Logical Device Expansion) for the RAID group of which Stripe Depth was changed is not available.
- Encryption of the RAID group of which Stripe Depth was changed is not available.

6.2.2 Delete RAID Group

This function deletes the registered RAID groups in the ETERNUS DX Disk storage system.
When a RAID group is deleted, the status of the drives that configured the RAID group change to data drives that are not used by any RAID group.

Caution

- RAID groups that have volumes registered cannot be deleted. When deleting a RAID group, delete the volumes beforehand.
- The RAID group that is registered in the TPP or the FTRP cannot be deleted.
- RAID groups that are registered as REC Disk Buffer cannot be deleted.
- Up to 128 RAID groups can be deleted at once.

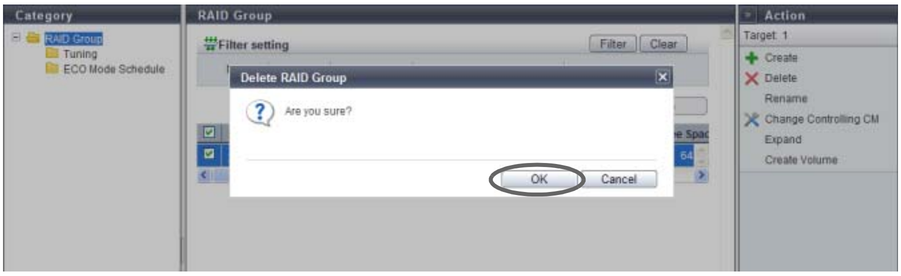
The procedure to delete a RAID group is as follows:

Procedure

1 Select the RAID group that is to be deleted (multiple selections can be made) and click [Delete] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ RAID group deletion starts.

3 Click the [Done] button to return to the [RAID Group] screen.

End of procedure

6.2.3 Rename RAID Group

This function changes the name of RAID groups that are registered in the ETERNUS DX Disk storage system. Multiple RAID groups can be renamed with a single operation.

Caution

Renaming RAID groups that configure FTRPs is not available.

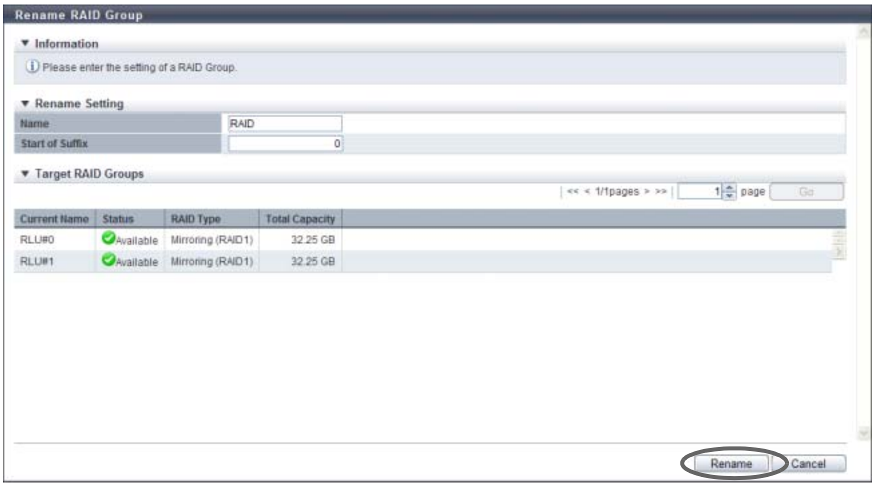
The procedure to rename RAID group is as follows:

Procedure

1 Select the RAID group to be renamed (multiple selections can be made) and click [Rename] in [Action].

2 Input the new "Name" and the "Start of Suffix", and click the [Rename] button.

- Name
  Specify a new RAID group name.
  The following input conditions apply:
  - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space
- Start of Suffix
  Input the starting number of the suffix that is to be added to the new RAID group name. When changing multiple RAID group names, the suffix number is added to the RAID group names with consecutive numbers in ascending order starting with the entered suffix number. Refer to "Naming conventions for renaming volumes" (page 993) for details. When changing only one RAID Group name, the "Start of Suffix" field is not displayed.
  The following input conditions apply:
  - Numeric characters ("0" - "99999")
  - Decimal number
  - 1 - 5 digits



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When new RAID group name is not input
- When the RAID group name does not satisfy the input conditions
- When inputting the existing RAID group name (when one RAID group is selected)
- When the "Start of Suffix" is not specified (when multiple RAID groups are selected)
- When the value in the "Start of Suffix" does not satisfy the input conditions (when multiple RAID groups are selected)

3 Click the [OK] button.



→ Changing RAID group name starts.

4 Click the [Done] button to return to the [RAID Group] screen.

End of procedure

6.2.4 Change Controlling CM

This function changes the controlling CM that is allocated to the RAID group.
Unequal loading between the CMs can be resolved by changing the controlling CM.

Caution

- While changing the controlling CM, the storage system status is changed from Write Back mode to Write Through mode, reducing the I/O performance for the ETERNUS DX Disk storage system. Perform this function when there are not many I/O operations. Changing the controlling CM may take up to 20 or 30 minutes.
- Changing the controlling CM for RAID groups that configure FTRPs is not available.
- This function cannot be used under the following conditions:
  - When a CM that is not in "Normal" status exists
  - When formatting or LUN Concatenation is being performed in the volumes that are registered in the target RAID group
  - When encryption is being performed in the target RAID group
  - When the target RAID group status is not "Available"
  - When rebuild, copyback, or redundant copy is being performed in the target RAID group
  - When LDE is being performed in the ETERNUS DX Disk storage system
  - When RAID migration is being performed in the ETERNUS DX Disk storage system
  - When a RAID group diagnosis is being performed in the ETERNUS DX Disk storage system
  - When a disk diagnosis is being performed in the ETERNUS DX Disk storage system
  - When balancing TPV is being performed in the ETERNUS DX Disk storage system
  - When balancing FTRP is being performed in the ETERNUS DX Disk storage system
  - When pinned data exists in the ETERNUS DX Disk storage system

Note

This function can also be used for changing the controlling CM of the RAID groups that configure a Thin Provisioning Pool (TPP).

The procedure to change controlling CM of the RAID group is as follows:

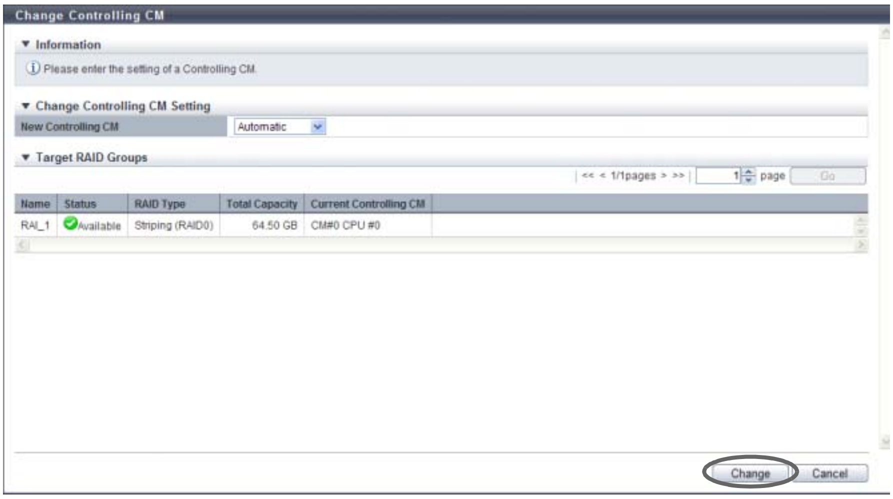
Procedure

1 Select the RAID group to change the controlling CM (multiple selections can be made) and click [Change Controlling CM] in [Action].

2 Select the controlling CM after changing, and click the [Change] button.

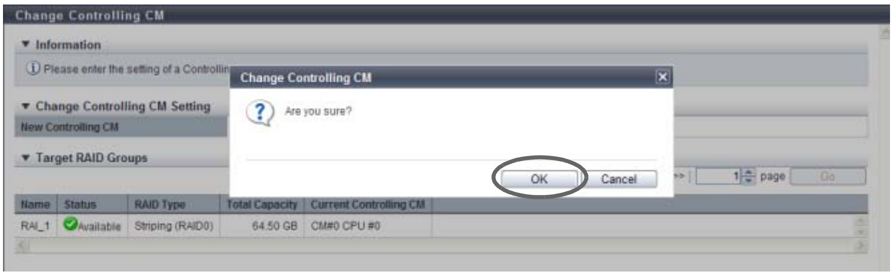
- New Controlling CM
  Specify the new controlling CM and CPU.
  "Automatic" and the installed "CM#x CPU#y" in normal status are displayed as options.
  - Automatic
  - CM#x CPU#y (x: CM number, y: CPU number)

  Select "Automatic" for normal operations. When "Automatic" is selected, the CM-CPU that is to be assigned is determined by the RAID group number. Refer to "Appendix F Automatic Controlling CM-CPU Setting" (page 1011) for details.



→ A confirmation screen appears.

3 Click the [OK] button.



→ Changing controlling CM starts.

Caution

During controlling CM change, the storage system status is changed from Write Back mode to Write Through mode.

4 Click the [Done] button to return to the [RAID Group] screen.

End of procedure

6.2.5 Expand RAID Group

This function adds drives to the existing RAID group by using the Logical Device Expansion (LDE) function to dynamically expand RAID group capacity. This function can also dynamically change the RAID type of an existing RAID group.

RAID group expansion provides the following features without stopping the ETERNUS DX Disk storage system operation:

- RAID group expansion add disks to the existing RAID group in units of one drive. This enables capacity expansion of RAID groups with smaller number of drive expansion.
- RAID groups can be expanded and any existing data in these RAID groups is retained.

Requirements for expanding a RAID group:

- The "Status" is " Available"
- Standard volumes, SDVs, or SDPVs are registered
- Not registered in the TPP
- Not registered in the FTRP
- Not registered as an REC Disk Buffer
- The RAID group is not blocked
- Formatting is not being performed for the volume that is registered in the RAID group
- Encryption is not being performed for the volume that is registered in the RAID group
- Storage Migration paths are not created in the volume that is registered in the RAID group
- The stripe size of the RAID group is not expanded (*1).

*1: A RAID group for which the Stripe Depth value in the [RAID Group (Basic)] screen of the [RAID Group (Basic Information)] screen is 128KB or more. Note that the Stripe Depth value for RAID1 cannot be changed. Refer to "6.1.5 RAID Group (Basic)" (page 169) for details.

Caution

- Before expanding the RAID group, back up data in all the logical volumes in the target RAID group to a different location. If not, data cannot be recovered when expansion fails. If expansion fails, data can be recovered from the backed up data.
- When adding drives, use drives that have the same capacity and speed as the drives that configure the target RAID group. If drives of different capacities exist in a RAID group, the smallest capacity becomes the standard for the RAID group after expansion, and all other drives are regarded as having the same capacity as the smallest drive. In this case, the remaining drive space is not used. In addition, if drives of different speeds exist in a RAID group, the access performance of the RAID group is reduced by the slower drives.
- If the drives that configure the target RAID group are SSDs, SSDs must be used when adding drives.
- If the drives that configure the target RAID group are SEDs, SEDs must be used when adding drives.
- RAID group expansion can be performed when the RAID group capacity after expansion is the same or larger than the current capacity.
- RAID group expansion can only be performed for one RAID group at a time.
- RAID group expansion cannot be suspended.

- The following functions cannot be used for RAID groups in which RAID group expansion is being performed:
  - Format volume
  - Create Volume
  - Encrypt Volume
  - RAID migration for the volume
  - Expand Volume
  - Preventive maintenance
  - Diagnosis for RAID group
  - Diagnosis for disks
- The following RAID type changes cannot be performed:
  - Changing the RAID type to "Striping (RAID0)" (changing the RAID type from "Striping (RAID0)" to a differently configured "Striping (RAID0)" is available)
  - Changing the RAID type to "Reliability (RAID5+0)"
  - Changing the RAID type from "Reliability (RAID5+0)"

Note

When expanding the drive capacity that configures a RAID group, use the procedure in "5.2.7 Start RAID Migration" (page 123) instead of this function.

The procedure to expand RAID group capacity is as follows:

Procedure

1 Select the RAID group that is to be expanded and click [Expand] in [Action].

2 Select the RAID type after expansion and the drives that are to be used after expansion.
Click the [Expand] button.

- RAID Type after expand
  Select the RAID type after expansion is performed.
  - High Performance (RAID1+0)
  - High Capacity (RAID5)
  - High Reliability (RAID6)
  - Striping (RAID0)
- Checkbox to select drives
  Select the checkbox for the drive to be used.
  When using the ETERNUS DX8100 S2/DX8700 S2, the restrictions that apply to the drive layout for RAID group configuration vary depending on the RAID type. Refer to "Restrictions of drive layout" (page 179) for details.

Caution

Requirements for selecting drives when changing the RAID type:

- When the RAID type before and after LDE is not changed, the drives that are used in the RAID group before LDE was performed cannot be deleted.
- When the RAID type is changed after LDE:
  - The number of RAID group data drives (*1) after LDE cannot be less than the number before LDE.

  *1: "Number of data drives" indicates the number of logical drives in RAID groups that contain user data. This number is different for each RAID type, as shown below:

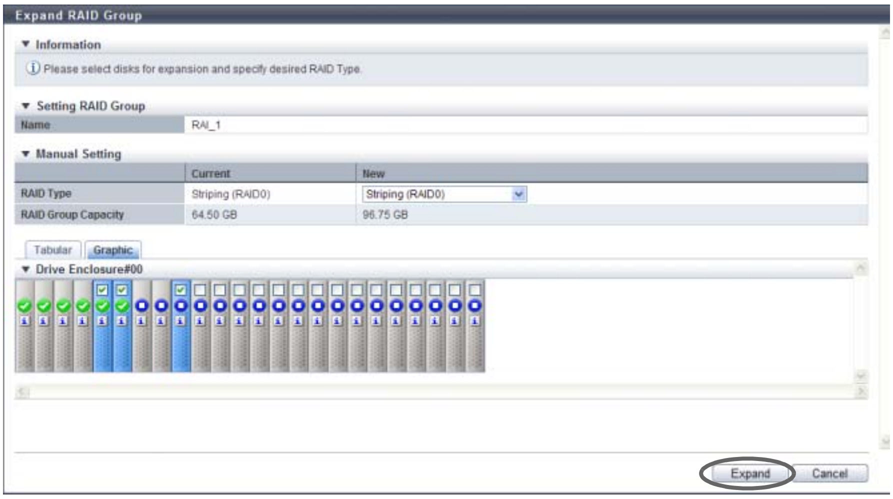
RAID type	Drive configuration (*2)	Number of data drives
High Performance (RAID1+0)	nD+nM	n
High Capacity (RAID5)	nD+1P	n
High Reliability (RAID6)	nD+2P	n
Mirroring (RAID1)	1D+1M	1
Striping (RAID0)	nD	n

  *2: D: Data drives, M: Mirror drives, P: Parity drives

  - Drives that are no longer used in a RAID group after changing the RAID type can be deleted. However, not all of the drives can be deleted from a RAID group.

Note

Drives can be selected from the list of drives that is displayed for Tabular or from the drive images that are displayed for Graphic. Click the Tabular tab to display a list of the drives or click the Graphic tab to display drive images.



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When the drive layout is incorrect
- The number of selected drives exceeds the available maximum number

3 Click the [OK] button.



→ RAID group expansion starts.

4 Click the [Done] button to return to the [RAID Group] screen.

End of procedure

6.2.6 Modify RAID Group Parameters

This function tunes the following parameters of each RAID group.

- DCMF
  DCMF is a coefficient for the command issuance amount of the drive. Specify this parameter to improve the sequential writing access performance. The bigger the value is, the more commands issue. Specify the DCMF according to the RAID group operation.
- Rebuild Priority
  Specify the level to give priority to rebuild, copyback, and redundant copy instead of host access. Specifying a larger "Rebuild Priority" value may improve rebuild, copyback, and redundant copy performance.
- Throttle
  Throttle is the proportion of the number of commands that are issued to a drive at the same time to the maximum number of commands that can be issued. By limiting the number of commands that are issued at the same time to the drive, the load on the specific RAID group (drive) is reduced.
- Ordered Cut
  Ordered Cut is the number of commands for optimizing drive access processing (priority control). By performing the priority control of commands in increments of the specified number, a long queue time for low-priority commands can be eliminated.

Caution

- When the "Rebuild Priority" setting is changed, the priority is changed not only for a rebuild, copyback, and redundant copy that will be performed after the setting is changed, but also for any rebuild, copyback, and redundant copy operations that are currently being performed.
- When the target RAID group is registered as an REC Disk Buffer, do not select "High" for the "Rebuild Priority" setting. Even if "High" is selected, rebuilding, copyback, and redundant copy are performed with "Middle" priority during host access.
- Specify the same RAID group parameters for all of the RAID groups that configure a WSV. If different RAID group parameters are specified, the host access performance may be reduced.

Note

- When specifying the "Throttle " or "Ordered Cut", enable the "Disk Tuning Parameter Setting" in advance.
- RAID groups that configure a WSV can be checked in the [Volume Detail] screen ([WSV Concatenation] Tab). Refer to "5.1.14 Volume Detail (WSV Concatenation)" (page 93) for details.

The procedure to change the RAID group parameters is as follows:

Procedure

1 Select which RAID groups to change the RAID group parameters for (multiple selections can be made) and click [Modify RAID Group Parameters] in [Action].

2 Specify the RAID group parameters, and click the [Modify] button.

- DCMF
  Specify the DCMF between 1 - 10. The default value is "1". It is not necessary to change the default setting for normal use.
  The maximum number of commands issued to a drive is changed to a multiple represented by the specified value. (If "DCMF" is "2", the number of commands is doubled. If "DCMF" is "3", the number of commands is tripled.) When not changing the DCMF, select "No Change".
  The higher the DCMF value is, the more drive throughput is available, improving sequential performance. Note that high DCMF value may result in a high load on the drive, decreasing performance.
- Rebuild Priority
  Specify the rebuild priority. The default setting is "Low". It is not necessary to change the default setting for normal use.
  When not changing the rebuild priority, select "No Change".
  When host access is not performed, rebuild, copyback, and redundant copy to RAID groups that is not registered as REC Disk Buffers are performed with "High" priority regardless of the "Rebuild Priority" setting.
  Rebuild, copyback, and redundant copy performance may be improved by specifying a larger "Rebuild Priority" value. Note that specifying larger "Rebuild Priority" may cause the degradation of RAID group performance when performing rebuild, copyback, or redundant copy is performed in the target RAID group.

- Low
  Perform rebuild, copyback, and redundant copy with a normal priority.
- Middle
  Give the same priority as the host access to rebuild, copyback, and redundant copy.
- High
  Give priority to rebuild, copyback, and redundant copy over host access.

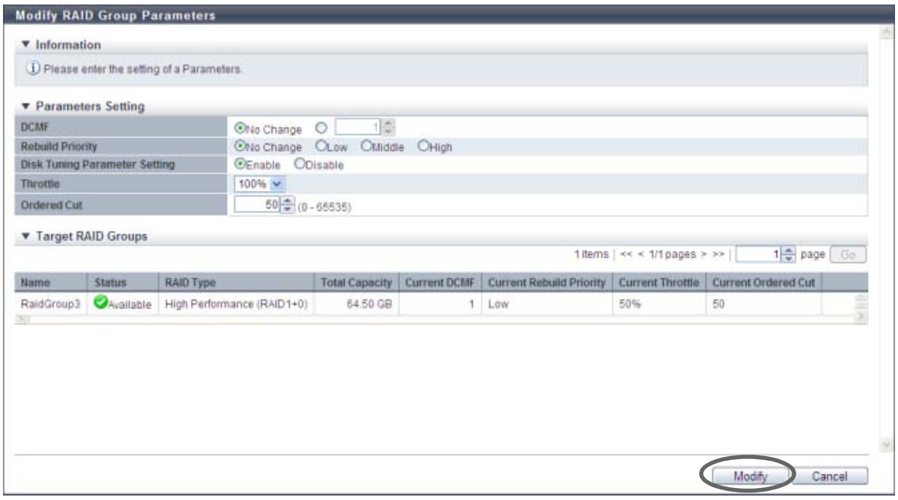
• Disk Tuning Parameter Setting
Specify whether to enable or disable the following disk tuning parameters.
- Throttle
- Ordered Cut

The default value varies depending on the storage system model. When using the ETERNUS DX80 S2/DX90 S2 or the ETERNUS DX410 S2/DX440 S2, the default setting is "Disable". When using the ETERNUS DX8100 S2/DX8700 S2, the default setting is "Enable". It is not necessary to change the default setting for normal use.

When selecting multiple RAID groups as the target of this function, the contents of display vary depending on the setting (Enable/Disable) for each RAID group. If all the settings point to the same state, that state is displayed. If not, "Disable" is displayed for the ETERNUS DX80 S2/DX90 S2 or the ETERNUS DX410 S2/DX440 S2, and "Enable" is displayed for the ETERNUS DX8100 S2/DX8700 S2.

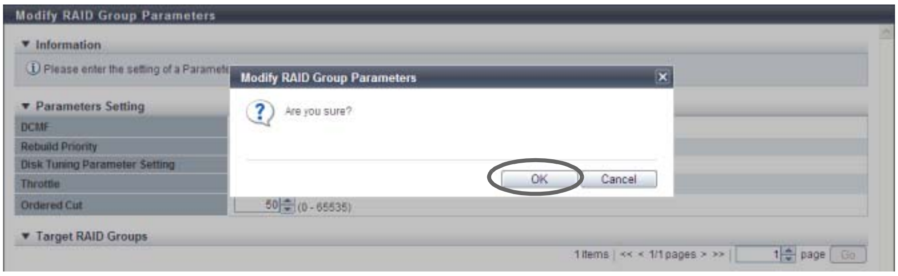
• Throttle
When "Disk Tuning Parameter Setting" is enabled, specify the proportion of the number of commands that is to be issued to a drive at the same time to the maximum number of command issuance between 100% and 10%. The default throttle value is "100%" (the default number of command issuance). It is not necessary to change the default value for normal use.
Specifying a low number limits the number of commands that are issued to a drive at the same time, reducing the load for the specific RAID group (drive). This setting can be used when the response performance of the specific RAID group (drive) is decreased due to a conflict between host I/O or batch processes. Note that a low Throttle value decreases the number of commands that are processed by the drive at the same time to avoid a long queue time.

• Ordered Cut
When "Disk Tuning Parameter Setting" is enabled, specify between 0 and 65535 for the number of commands to optimize drive access processing (priority control).
The default value varies depending on the model. The default value is "0" for the ETERNUS DX80 S2/DX90 S2 and the ETERNUS DX410 S2/DX440 S2, and "400" for the ETERNUS DX8100 S2/DX8700 S2.
When Ordered Cut is "x", the order is changed for every x commands based on the priority settings of the commands. It is not necessary to change the default value for normal use.
When "Ordered Cut" is "0", the number of commands for controlling the priority cannot be specified. All of the commands issued to the drive are processed according to their priority settings. The Ordered Cut value cannot be used for SSDs.
Specifying a low value for Ordered Cut reduces the number of commands for priority control. Commands with a lower priority are processed without delay. Note that by specifying a low value for Ordered Cut, the priority control of commands is performed in increments for the specified number, which might cause a delay in processing commands with a higher priority.



→ A confirmation screen appears.

3 Click the [OK] button.



→ The RAID group parameter modification starts.

Caution

When enabling the "Disk Tuning Parameter Setting", a confirmation screen with a warning message appears.

4 Click the [Done] button to return to the [RAID Group] screen.

End of procedure

6.2.7 Assign ECO Mode Schedule (RAID Group)

This function applies the ECO mode schedule to the RAID groups and enables the ECO mode setting.
ECO mode is a function to reduce power consumption by stopping motor of disks that configure the RAID group while the RAID group is not accessed from the host.
When the ECO mode schedule is applied to a RAID group, the ECO mode setting is enabled. When ECO mode is running, disk motors are activated during the scheduled event term. During times other than the scheduled time, disk motors are stopped.
If the RAID group is accessed from the host while the disk motors are stopped, the disk motors are activated and can be accessed within 1 - 5 minutes.

<table>
<tr><th colspan="3" rowspan="2">ECO Mode Schedule Setting</th><th colspan="2">ECO Mode General Setting</th></tr>
<tr><th>Enabled</th><th>Disabled</th></tr>
<tr><td rowspan="3">Control Status</td><td rowspan="2">ON</td><td>During scheduled event term</td><td>Disk motor is activated. (ECO mode is running)</td><td rowspan="5">Disk motor runs regardless of schedule settings. (ECO mode is not running)</td></tr>
<tr><td>Times other than scheduled event term</td><td>Disk motor is stopped. (ECO mode is running)
If the RAID group is accessed, disk motors are activated within 1 - 5 minutes.</td></tr>
<tr><td colspan="2">OFF</td><td>The target disk motor is operating constantly. (ECO mode is not running)</td></tr>
<tr><td colspan="3">Schedule is not applied</td><td>Disk motor is operating constantly. (ECO mode is not running)</td></tr>
<tr><td colspan="3">Disks not registered in the RAID groups</td><td>Disk motor is stopped constantly. (ECO mode is running)</td></tr>
</table>

Caution

- Before applying ECO mode for RAID groups, use the procedure in "11.2.8.1 Modify ECO Mode General Setting" (page 869) to enable the ECO mode setting for the ETERNUS DX Disk storage system.
- Set the ECO mode schedule using the procedure in "11.2.8.4 Modify ECO Mode Schedule" (page 876).
- ECO mode is not available for the following RAID groups:
  - No volumes are created
  - A Storage Migration path is created in the volume
  - Configured by SSDs
  - Registered as an REC Disk Buffer
- RAID groups to which the Snap Data Pool Volumes (SDPVs) belong cannot be selected as the target for disk motor management by the ECO mode.
- When using ECO mode, make sure to set the time/date correctly. If the time/date of the ETERNUS DX Disk storage system is wrong, processes used for stopping and starting the disk motor cannot be performed per the ECO mode schedule.
- If any of the following conditions occur even when the disk motor is inactive, the disk motor is activated. The ECO mode schedule is re-enabled when the conditions listed have finished.
  - When the target RAID group status is not " Available"
  - When performing functions that change the RAID group or the volume configuration
  - When performing rebuild or copyback in the target RAID group
  - When LDE is being performed in the RAID group
  - When formatting is being performed in the volumes registered in the RAID group
  - When RAID migration is being performed in the volumes registered in the RAID group
  - When Advanced Copy is being performed in the volume registered in the RAID group (copy session status is not "Suspend" or "Tracking")
  - When encryption is being performed in the volumes registered in the RAID group
  - During maintenance
  - When performing disk diagnosis, RAID group diagnosis, or when exporting G-List
  - Module error related to access path to the Controller Modules and drives is detected
- Specify the same ECO mode schedule for all of the RAID groups that configure a WSV. If a different ECO mode schedule is specified, activation of a stopped drive is required to accept the host access, and the performance of the response may be reduced.

Note

- When selecting multiple RAID groups as the target of the ECO mode, the same ECO mode schedule can be specified for all the selected RAID groups.
- RAID groups that configure a WSV can be checked in the [Volume Detail] screen ([WSV Concatenation] Tab). Refer to "5.1.14 Volume Detail (WSV Concatenation)" (page 93) for details.

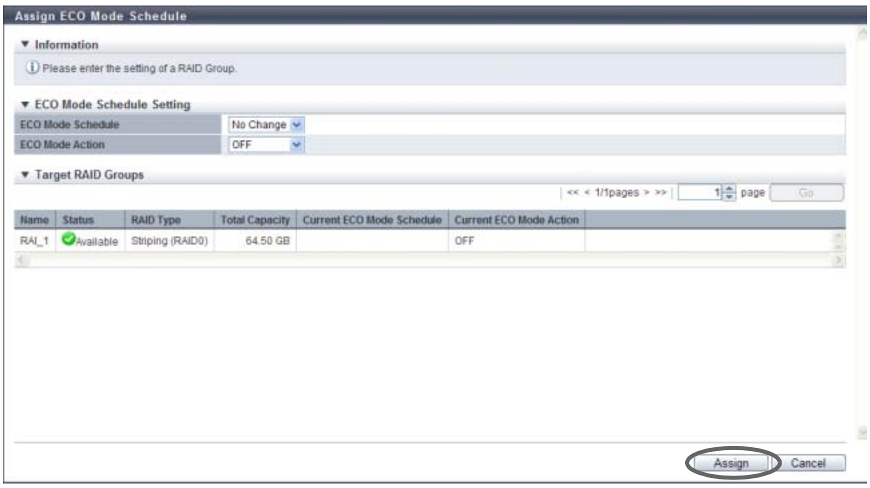
The procedure to set ECO mode schedule for the RAID group is as follows:

Procedure

1 Select the RAID group to apply the ECO mode schedule (multiple selections can be made) to and click [Assign ECO Mode] in [Action].

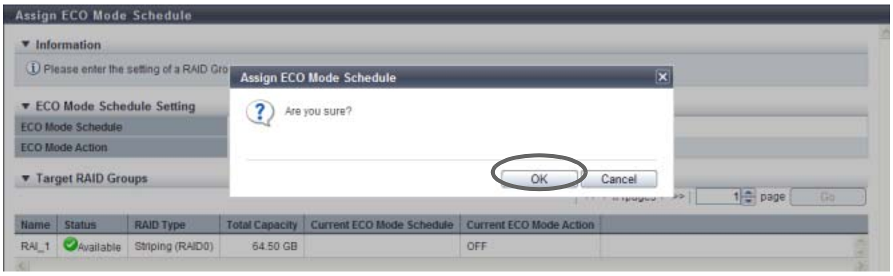
2 Select the ECO mode schedule that is to be applied, select whether to enable ("ON") or disable ("OFF") ECO mode, and then click the [Assign] button.

- ECO Mode Schedule
  Select the ECO mode schedule that is to be applied.
  - No Change
    Do not change the current setting.
  - Disable
    Disable the ECO mode.
  - ECO mode schedule name
    Apply the selected ECO mode schedule.
- ECO Mode Action
  Select whether to enable ("ON") or disable ("OFF") the ECO mode setting. Select "No Change" to use the current setting.
  - No Change
    Do not change the current setting.
  - ON
    Enable the ECO mode.
  - OFF
    Disable the ECO mode.



→ A confirmation screen appears.

3 Click the [OK] button.



→ Setting of the ECO mode schedule starts.

4 Click the [Done] button to return to the [RAID Group] screen.

End of procedure

6.2.8 Set Key Group (RAID Group)

This function registers or deletes any RAID groups that are configured with SEDs in the key group.
The key group combines all of the RAID groups that use the same SED authentication key.
RAID groups in the key group are managed by the SED authentication key that is obtained from the key server. One key group can be created in the ETERNUS DX Disk storage system.
If a RAID group is not registered in the key group, the RAID group is managed by the common key.

Caution

When registering RAID groups in the key group, perform the following settings:

- Create a key group.
- Allocate the master server or the slave server to the key group.
- Set the key for the key group and confirm that the key status is "Normal".

Refer to "11.2.6.6 Create Key Group" (page 841) and "11.2.6.9 Update SED Authentication Key" (page 849) for details.

Note

- Information on the RAID groups that are configured by SEDs and registration status to the key group can be checked in the [SED Key Group] screen. Refer to "6.1.4 SED Key Group" (page 167) for details.
- Use the [Key Group] screen to check the SED authentication key information and the SSL/KMIP certificate information that is used for the key group. Refer to "11.1.5.1 Key Group" (page 723) for details.
- Even when operations are being performed for volumes that configure a key management target RAID group, this RAID group can be added to or deleted from the key group.

The procedure to register or delete the RAID groups in the key group is as follows:

Procedure

1 Select which RAID group to add to or delete from the key group (multiple selections can be made), and click [Set Key Group] in [Action].

> **Caution**
>
> Settings for the selected RAID groups are applied in a single process. To add or delete multiple RAID groups, only select the RAID groups that are to be added or deleted (do not select all of the RAID groups).

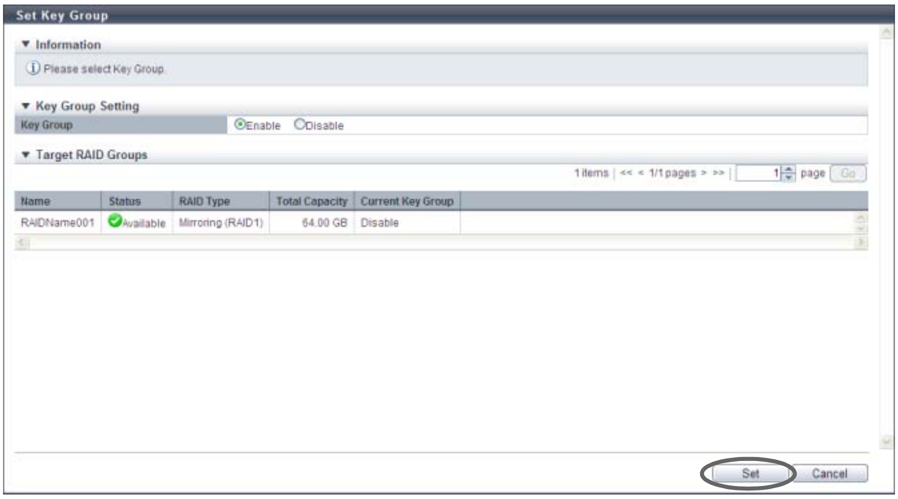
2 Select the key group setting status, and click the [Set] button.

■ When adding RAID groups

- Key Group
  To add RAID groups, select "Enable".
  If multiple RAID groups are selected, all the selected RAID groups are added in a single process.

■ When deleting RAID groups

- Key Group
  To delete RAID groups, select "Disable".
  If multiple RAID groups are selected, all the selected RAID groups are deleted in a single process.



→ A confirmation screen appears.

3 Click the [OK] button.



→ Key group setting starts.

Caution

An error screen appears in the following conditions:

- If there is a RAID group with a status other than " Available"
- If the status of the key in the key group is not "Normal", "Expiration", or "Modifying"
- If "Enable" is selected but no key group has been created
- If no master or slave server is applied to the key group when "Enable" is selected

4 Click the [Done] button to return to the [SED Key Group] screen.

End of procedure

6.2.9 Recovery SED

This function recovers the RAID groups that are in locked status.
"Locked status" indicates that the RAID group is blocked because the SED authentication key could not be obtained from the key server.

Conditions that can be recovered by using the "Recovery SED" function

- Locked status when enabling or forcibly enabling a disk
- Locked status when forcibly recovering or forcibly enabling a RAID group
- Locked status when recovering from DE failure
- Locked status when applying disk firmware
- Locked status when starting an operation after a disk has been stopped by the ECO mode
- Locked status when communication with the key server failed when starting or rebooting the ETERNUS DX Disk storage system

Caution

This function can only be used to recover locked RAID groups. This function cannot be used for recovering blocked RAID groups that occur due to errors that are not listed above. Recovery operation of RAID groups for which the status is " Broken" can be performed by using the [Recover RAID Group] function. Note that the [Recover RAID Group] function can be performed by a maintenance engineer who has the "Maintenance Operation" policy.

Note

- SED recovery from locked status is performed according to the "Recovery Mode" setting of the key group. The "Recovery Mode" setting can be checked in the [Key Group] screen. Refer to "11.1.5.1 Key Group" (page 723) for details.
  - When "Recovery Mode" is "Auto", the ETERNUS DX Disk storage system monitors the RAID group periodically. If a locked RAID group is detected, recovery is performed on the RAID group by the ETERNUS DX Disk storage system automatically.
  - When "Recovery Mode" is "Manual", use this function to manually recover the locked RAID group.
- "Recovery Mode" can be specified when creating a key group. Refer to "11.2.6.6 Create Key Group" (page 841) for details.
- This function can be used even if a key group is not created or no locked RAID groups are exist. If there are no locked RAID groups that can be recovered, this function completes successfully.

The procedure to recover RAID groups that are in the locked status is as follows:

Procedure

1 Click [Recovery SED] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ Recovery of the SED starts.

3 Click the [Done] button to return to the [SED Key Group] screen.

End of procedure

Chapter 7
Thin Provisioning Pool Management

This chapter describes Thin Provisioning Pool management.

7.1 Thin Provisioning Pool Status

Thin Provisioning Pool status displays the status information of volumes.
Thin Provisioning Pool status screens can be displayed by clicking the following categories:

Thin Provisioning Pool status screen	Category
Thin Provisioning Pool (Basic Information)	Thin Provisioning Pools
Threshold (Thin Provisioning Pool)	Threshold
ECO Mode Schedule (Thin Provisioning Pool)	ECO Mode Schedule
License (Thin Provisioning)	License
Flexible Tier Pool (Basic Information)	Flexible Tier Pools

Detailed information of the Thin Provisioning Pools can be displayed from the following screen:
- Thin Provisioning Pool Detail (Basic)
- Flexible Tier Pool Detail (Basic)
- Flexible Tier Pool Detail (Flexible Tier Sub Pool)
- Flexible Tier Pool Detail (Volume)
- Flexible Tier Sub Pool Detail (Basic)

7.1.1 Thin Provisioning Pool (Basic Information)

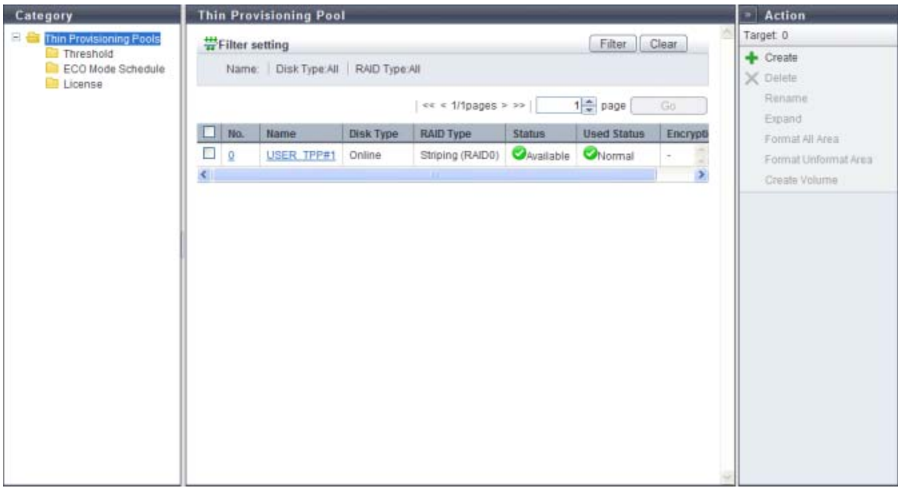
This function shows the list of TPPs.

Caution

- Registering the license for the Thin Provisioning feature is required to use the Thin Provisioning function. To check the registration status of the license, refer to "7.1.4 License (Thin Provisioning)" (page 206).
- When " Attention" or " Warning" is displayed in "Used Status" in the TPP list, the TPP used capacity exceeds the threshold. Add drives immediately to expand the TPP capacity.

Note

- This function displays the TPP basic information, a list of the RAID groups that configure the TPP, and a list of the TPVs that are registered in the TPP.
- To check the threshold for monitoring the used capacity of a TPP, refer to "7.1.2 Threshold (Thin Provisioning Pool)" (page 202).
- To check the ECO mode settings of a TPP, refer to "7.1.3 ECO Mode Schedule (Thin Provisioning Pool)" (page 203).



The following items are displayed in the Main area:

- No.
  The TPP number is displayed. Click this item to display the screen shown in "7.1.6 Thin Provisioning Pool Detail (Basic)" (page 209).

- Name
  The TPP name is displayed. Click this item to display the screen shown in "7.1.6 Thin Provisioning Pool Detail (Basic)" (page 209).

- Disk Type
  The type of drive that configures the TPP is displayed.
  - Online
    SAS disks
  - Nearline
    Nearline SAS disks
  - SSD
  - SED
- RAID Type
  The type of RAID group that configures the TPP is displayed.
  - High Performance (RAID1+0)
  - High Capacity (RAID5)
  - High Reliability (RAID6)
  - Mirroring (RAID1)
  - Striping (RAID0)
- Status
  The TPP status is displayed. Refer to "B.4 Thin Provisioning Pool Status" (page 976) for detailed information of TPP status.
- Used Status
  The usage of TPP is displayed.
  - Normal
    TPP usage does not exceed the "Attention" threshold.
  - Attention
    TPP usage exceeds the "Attention" threshold but does not exceed the "Warning" threshold.
  - Warning
    TPP usage exceeds the "Warning" threshold.
- Encryption
  The TPP encryption status is displayed.
  - CM
    The TPP that is encrypted by CM.
  - "-" (hyphen)
    The TPP that is not encrypted.
  - SED
    The TPP that is encrypted by SED.

Filter setting

Filter	Description
Name	Input the TPP name that is to be displayed. When not using the TPP name for filtering, leave this item blank.
Disk Type	Select the disk type that is to be displayed.
RAID Type	Select the RAID type that is to be displayed.

7.1.2 Threshold (Thin Provisioning Pool)

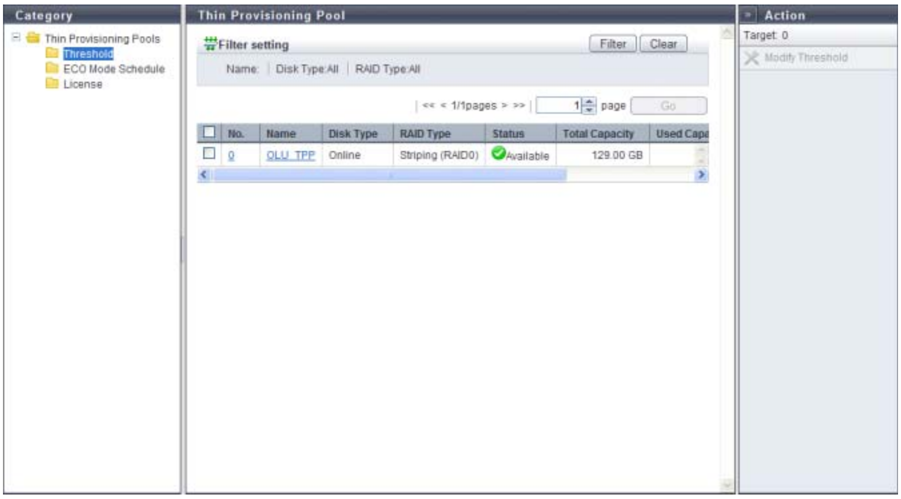
This function shows the threshold for monitoring the used capacity of a Thin Provisioning Pool.

Caution

Registering the license for the Thin Provisioning feature is required to use Thin Provisioning function. To check the registration status of the license, refer to "7.1.4 License (Thin Provisioning)" (page 206).

Note

- If the TPP used capacity exceeds the threshold, notification is sent to the destination for REMCS (REMote Customer Support system) center, SNMP Trap, E-Mail or syslog that was specified using the procedure in "11.2.9.1 Setup Event Notification" (page 880).
- To change the threshold of a TPP, follow the procedure that is provided in "7.2.7 Modify Threshold Thin Provisioning Pool" (page 239).



The following items are displayed in the Main area:

- No.
  The TPP number is displayed. Click this item to display the screen shown in "7.1.6 Thin Provisioning Pool Detail (Basic)" (page 209).
- Name
  The TPP name is displayed. Click this item to display the screen shown in "7.1.6 Thin Provisioning Pool Detail (Basic)" (page 209).
- Disk Type
  The type of drive that configures the TPP is displayed.
  - Online
    SAS disks
  - Nearline
    Nearline SAS disks
  - SSD
  - SED

- RAID Type
  The type of RAID group that configures the TPP is displayed.
  - High Performance (RAID1+0)
  - High Capacity (RAID5)
  - High Reliability (RAID6)
  - Mirroring (RAID1)
  - Striping (RAID0)
- Status
  The TPP status is displayed. Refer to "B.4 Thin Provisioning Pool Status" (page 976) for detailed information of TPP status.
- Total Capacity
  The total capacity of TPP is displayed.
- Used Capacity
  The used capacity of TPP is displayed.
- Warning
  The warning threshold (%) for monitoring the TPP used capacity is displayed.
- Attention
  The attention threshold (%) for monitoring the TPP used capacity is displayed. When the "Attention" threshold is omitted, "0%" is displayed.
- MWC
  Multi Writeback Count (MWC) of the TPP is displayed.

Filter setting

Filter	Description
Name	Input the TPP name that is to be displayed. When not using the TPP name for filtering, leave this item blank.
Disk Type	Select the disk type that is to be displayed.
RAID Type	Select the RAID type that is to be displayed.

7.1.3 ECO Mode Schedule (Thin Provisioning Pool)

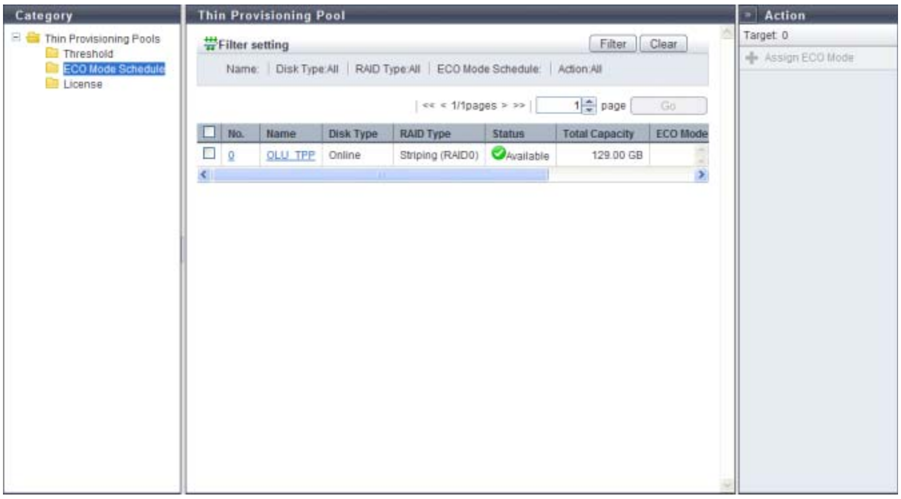
This function displays the ECO mode setting status of the Thin Provisioning Pool.

Caution

Registering the license for the Thin Provisioning feature is required to use the Thin Provisioning function. To check the registration status of the license, refer to "7.1.4 License (Thin Provisioning)" (page 206).

Note

- To use the ECO mode, follow the procedure in "11.2.8.1 Modify ECO Mode General Setting" (page 869) and "11.2.8.2 Create ECO Mode Schedule" (page 871) to perform the general ECO mode setup and create an ECO mode schedule.
- To assign the ECO mode to a TPP, refer to "7.2.9 Assign ECO Mode Schedule (Thin Provisioning Pool)" (page 242).



The following items are displayed in the Main area:

- No.
  The TPP number is displayed. Click this item to display the screen shown in "7.1.6 Thin Provisioning Pool Detail (Basic)" (page 209).
- Name
  The TPP name is displayed. Click this item to display the screen shown in "7.1.6 Thin Provisioning Pool Detail (Basic)" (page 209).
- Disk Type
  The type of drive that configures the TPP is displayed.
  - Online
    SAS disks
  - Nearline
    Nearline SAS disks
  - SED
- RAID Type
  The type of RAID group that configures the TPP is displayed.
  - High Performance (RAID1+0)
  - High Capacity (RAID5)
  - High Reliability (RAID6)
  - Mirroring (RAID1)
  - Striping (RAID0)
- Status
  The TPP status is displayed. Refer to "B.4 Thin Provisioning Pool Status" (page 976) for detailed information of TPP status.

- Total Capacity
  The total capacity of TPP is displayed.
- ECO Mode Schedule
  The ECO mode schedule that is assigned to the TPP is displayed.
  If the ECO mode schedule is not assigned, the field is blank.
- ECO Mode Action
  When the ECO mode is enabled in TPP, "ON" is displayed. If the ECO mode is disabled, "OFF" is displayed.
  If the ECO mode is not assigned, a "-" (hyphen) is displayed.
- Motor Status
  The disk motor status for the TPP is displayed.
  - Active
    The disk motors are activated.
  - In the Boot Process
    The disk motors are starting up.
  - Idle
    The disk motors are stopped.
  - In the Stop Process
    The disk motors are being stopped.

Filter setting

Filter	Description
Name	Input the TPP name that is to be displayed. When not using the TPP name for filtering, leave this item blank.
Disk Type	Select the disk type that is to be displayed.
RAID Type	Select the RAID type that is to be displayed.
ECO Mode Schedule	Select the ECO mode schedule that is to be displayed.
Action	Select the action that is to be displayed.

7.1.4 License (Thin Provisioning)

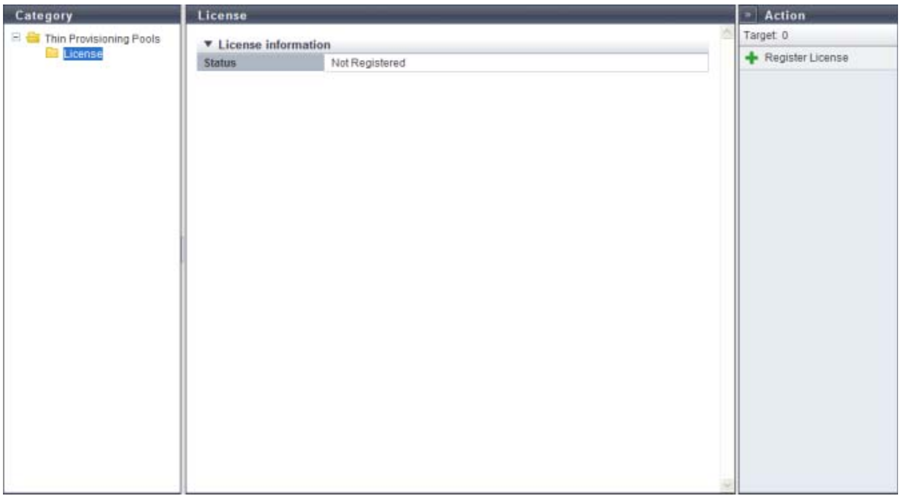
The registration status of the Thin Provisioning license is displayed.

Caution

Registering the license for the Thin Provisioning feature is required to use Thin Provisioning function.

Note

Registering or deleting the Thin Provisioning license can be performed depending on the license registration status. To register the license, refer to "7.2.10 Register Thin Provisioning License" (page 245). To delete the license, refer to "7.2.11 Delete Thin Provisioning License" (page 247).



The following items are displayed in the Main area:

- Status
  The registration status of the Thin Provisioning license is displayed.
  - Registered
  - Not Registered

7.1.5 Flexible Tier Pool (Basic Information)

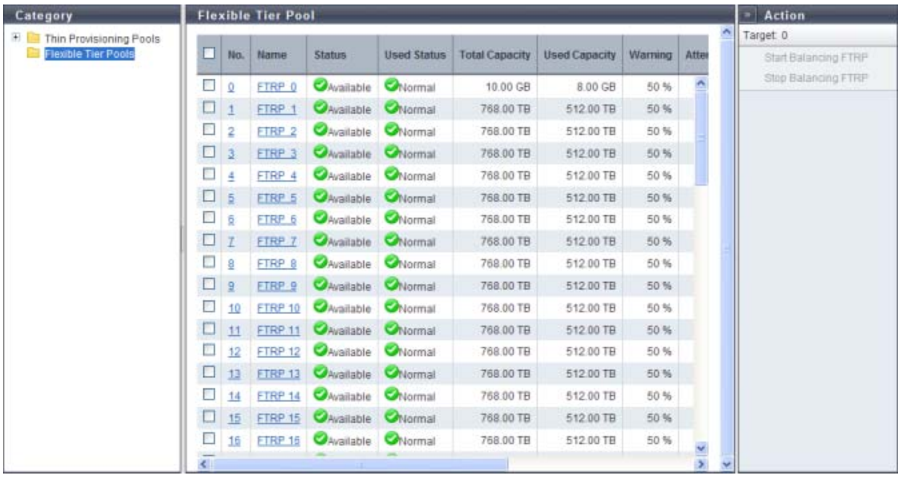
This function shows the list of Flexible Tier Pools (FTRPs).

Caution

- To use the Flexible Tier function (auto storage layering), the following operations are required:
  - Registering the license for the Thin Provisioning feature is required to use the Thin Provisioning function. To check the registration status of the license, refer to "7.1.4 License (Thin Provisioning)" (page 206).
  - Register the Optimization option for ETERNUS SF Storage Cruiser.
  - Create the Flexible Tier Pools (FTRPs), Flexible Tier Sub Pools (FTSPs), and the Flexible Tier Volumes (FTVs), using the ETERNUS SF Storage Cruiser.
- When " Attention" or " Warning" is displayed in "Used Status" in the FTRP list, the FTRP used capacity exceeds the threshold. Immediately add drives and use ETERNUS SF Storage Cruiser to expand the capacity of the appropriate FTSP (for which expansion is determined to be necessary based upon the performance and used capacity).
- If the target FTRP does not exist when displaying the details screen, a message, " Target is Not Found." is displayed.
- The required policy for the [Format Flexible Tier Pool (All Area)] function and the [Format Flexible Tier Pool (Unformatted Area)] function is changed from "RAID Group Management" to "Maintenance Operation" with controller firmware V10L40. To format the Flexible Tier Pool with an ETERNUS DX Disk storage system that has controller firmware version V10L40 or later, ask a maintenance engineer who has the "Maintenance Operation" policy.

Note

This function displays a basic FTRP information, a list of FTSPs which belong to the FTRP, a list of RAID groups which configure the FTSP, and a list of FTVs which have been registered to the FTRP.



The following items are displayed in the Main area:

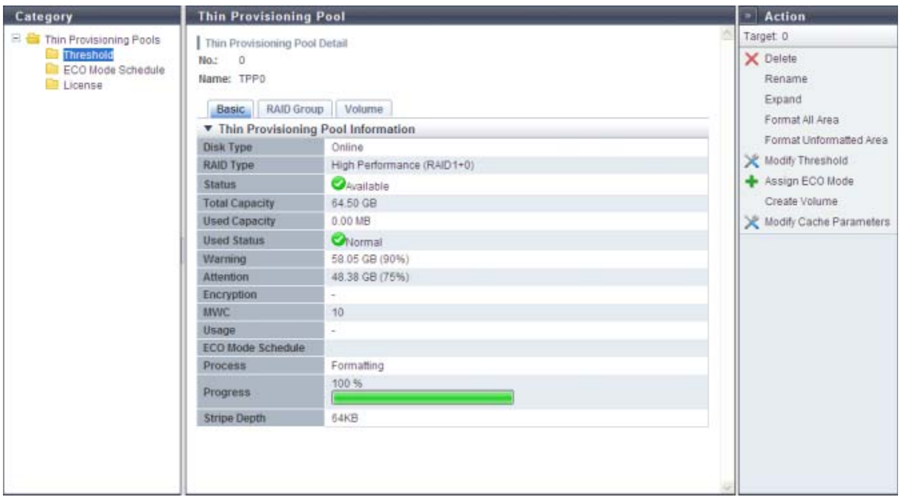
- No.
  The FTRP number is displayed. Click this item to display the screen shown in "7.1.7 Flexible Tier Pool Detail (Basic)" (page 212).
  - ETERNUS DX80 S2/DX90 S2: 0 - 29
  - ETERNUS DX410 S2: 0 - 59
  - ETERNUS DX440 S2: 0 - 63
  - ETERNUS DX8100 S2: 0 - 11
  - ETERNUS DX8700 S2: 0 - 63
- Name
  The FTRP name is displayed. Click this item to display the screen shown in "7.1.7 Flexible Tier Pool Detail (Basic)" (page 212).
- Status
  The FTRP status is displayed. Refer to "B.4 Thin Provisioning Pool Status" (page 976) for detailed information of FTRP status.
- Used Status
  The usage of FTRP is displayed.
  - Normal
    FTRP usage does not exceed the "Attention" threshold.
  - Attention
    FTRP usage exceeds the "Attention" threshold but does not exceed the "Warning" threshold.
  - Warning
    FTRP usage exceeds the "Warning" threshold.
- Total Capacity
  The total capacity of FTRP is displayed.
- Used Capacity
  The used capacity of FTRP is displayed.
- Warning
  The warning threshold (%) for monitoring the FTRP used capacity is displayed.
- Attention
  The attention threshold (%) for monitoring the FTRP used capacity is displayed. When the "Attention" threshold is omitted, "0%" is displayed.
- Encryption
  The FTRP encryption status is displayed.
  - CM
    The FTRP that is encrypted by CM.
  - "-" (hyphen)
    The FTRP that is not encrypted.

- Balancing Level
  The balancing level of the FTRP is displayed.
  If multiple FTSPs exists in the FTRP, the lowest balancing level among the FTSPs is displayed. A "-" (hyphen) is displayed when the physically allocated capacity cannot be checked due to the storage system status or when the balancing level cannot be obtained due to the FTRP status (*1).
  - High
    The physically allocated capacity among the RAID groups in the FTSP is equalized.
  - Middle
    The physically allocated capacity among the RAID groups in the FTSP is slightly unequal.
  - Low
    The physically allocated capacity among the RAID groups in the FTSP is significantly unequal.
- Balancing Process
  A "-" (hyphen) is displayed when FTRP balancing is not being performed, when the physically allocated capacity cannot be checked due to the storage system status, or when the balancing level cannot be obtained due to the FTRP status (*1).
  - Status
    The balancing status of the FTRP is displayed.
    - Active
      All of the FTVs in the FTRP are either reserved or operating normally.
    - Error
      An FTV in error status exists in the FTRP.
  - Error Code
    The error code of FTRP balancing is displayed when an error occurs.
    A "-" (hyphen) is displayed if no errors occur.

*1: The status of the FTRP is not " Available", " Partially Readying", or " Exposed"

7.1.6 Thin Provisioning Pool Detail (Basic)

Click the [No.] link or the [Name] link on the "7.1.1 Thin Provisioning Pool (Basic Information)" (page 200) to display the corresponding Thin Provisioning Pool Details screen.



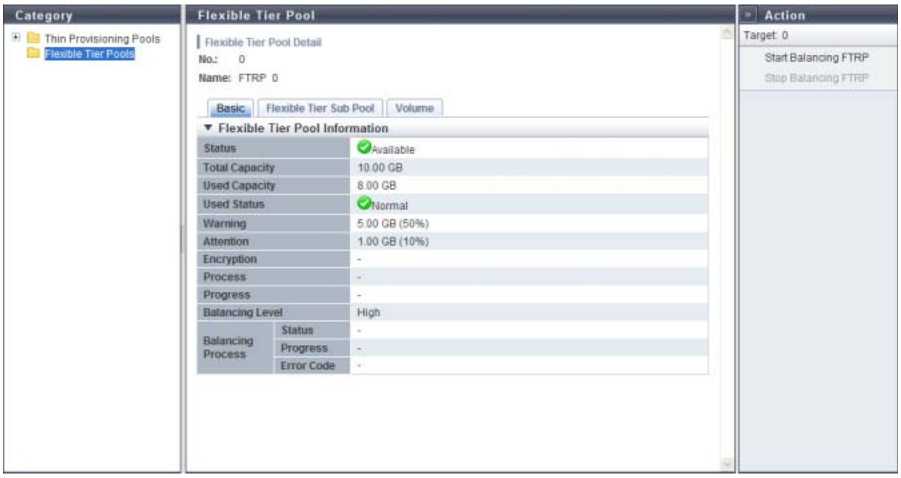
The following items are displayed in the Main area:

- Disk Type
  The type of drive that configures the TPP is displayed.
  - Online:
    SAS disks
  - Nearline
    Nearline SAS disks
  - SSD
  - SED
- RAID Type
  The type of RAID group that configures the TPP is displayed.
  - High Performance (RAID1+0)
  - High Capacity (RAID5)
  - High Reliability (RAID6)
  - Mirroring (RAID1)
  - Striping (RAID0)
- Status
  The TPP status is displayed. Refer to "B.4 Thin Provisioning Pool Status" (page 976) for detailed information of TPP status.
- Total Capacity
  The total capacity of TPP is displayed.
- Used Capacity
  The used capacity of TPP is displayed.
- Used Status
  The usage of TPP is displayed.
  - Normal
    TPP usage does not exceed the "Attention" threshold.
  - Attention
    TPP usage exceeds the "Attention" threshold but does not exceed the "Warning" threshold.
  - Warning
    TPP usage exceeds the "Warning" threshold.
- Warning
  The TPP physical capacity "xxx", which is converted based on the TPP warning threshold, and the threshold (yy%) are displayed.
- Attention
  The TPP physical capacity "xxx", which is converted based on the TPP attention threshold, and the threshold (yy%) are displayed.
  When the attention threshold is omitted, a "-" (hyphen) is displayed.

- Encryption
  The TPP encryption status is displayed.
  - CM
    The TPP that is encrypted by CM.
  - "-" (hyphen)
    The TPP that is not encrypted.
  - SED
    The TPP that is encrypted by SED.
- MWC
  Multi Writeback Count (MWC) of the TPP is displayed.
- Usage
  "TPV" is displayed when a TPV is registered in the TPP.
  If there are no TPVs in the Thin Provisioning Pool, a "-" (hyphen) is displayed.
- ECO Mode Schedule
  The ECO mode schedule that is assigned to the TPP is displayed.
  If the ECO mode schedule is not specified, the field is blank.
- Process
  A process that is being performed for the TPP is displayed. If no process is being performed, a "-" (hyphen) is displayed.
- Progress
  The progress rate for the TPP is displayed.
  If no process is being performed, a "-" (hyphen) is displayed.
- Stripe Depth
  The Stripe Depth value (*1) for the RAID groups that configures the TPP is displayed.
  If the RAID type is "Mirroring (RAID1)", a "-" (hyphen) is displayed.
  *1: The number of logical blocks that are assigned to a drive for each stripe when configuring a stripe volume in a RAID group. Normally, it is 64KB.

7.1.7 Flexible Tier Pool Detail (Basic)

Click the [No.] link or the [Name] link on the "7.1.5 Flexible Tier Pool (Basic Information)" (page 207) to display the detailed information of the corresponding FTRP.
Click the [Basic] tab on the [Flexible Tier Pool Detail] to display the basic information of the corresponding FTRP.



The following items are displayed in the Main area:

- Status
  The FTRP status is displayed. Refer to "B.4 Thin Provisioning Pool Status" (page 976) for detailed information of FTRP status.

- Total Capacity
  The total capacity of FTRP is displayed.

- Used Capacity
  The used capacity of FTRP is displayed.

- Used Status
  The usage of FTRP is displayed.
  -  Normal
    FTRP usage does not exceed the "Attention" threshold.
  -  Attention
    FTRP usage exceeds the "Attention" threshold but does not exceed the "Warning" threshold.
  -  Warning
    FTRP usage exceeds the "Warning" threshold.

- Warning
  The FTRP physical capacity "xxx", which is converted based on the FTRP warning threshold, and the threshold (yy%) are displayed.

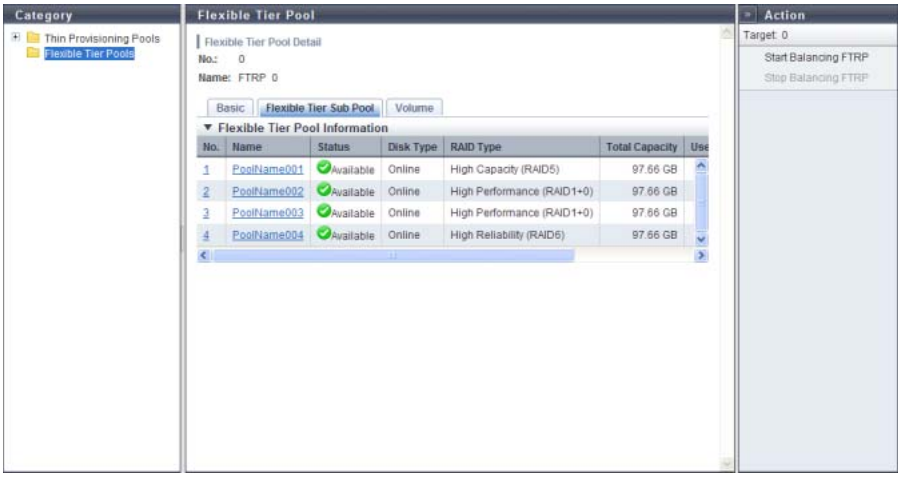
- Attention
  The FTRP physical capacity "xxx", which is converted based on the FTRP attention threshold, and the threshold (yy%) are displayed.
  When the attention threshold is omitted, a "-" (hyphen) is displayed.

- Encryption
  The FTRP encryption status is displayed.
  - CM
    The FTRP that is encrypted by CM.
  - "-" (hyphen)
    The FTRP that is not encrypted.
- Process
  A process that is being performed for the FTRP is displayed. If no process is being performed, a "-" (hyphen) is displayed.
- Progress
  The progress rate for the FTRP is displayed.
  If no process is being performed, a "-" (hyphen) is displayed.
- Balancing Level
  The balancing level of the FTRP is displayed.
  If multiple FTSPs exists in the FTRP, the lowest balancing level among the FTSPs is displayed. A "-" (hyphen) is displayed when the physically allocated capacity cannot be checked due to the storage system status or when the balancing level cannot be obtained due to the FTRP status (*1).
  - High
    The physically allocated capacity among the RAID groups in the FTSP is equalized.
  - Middle
    The physically allocated capacity among the RAID groups in the FTSP is slightly unequal.
  - Low
    The physically allocated capacity among the RAID groups in the FTSP is significantly unequal.
- Balancing Process
  A "-" (hyphen) is displayed when FTRP balancing is not being performed, when the physically allocated capacity cannot be checked due to the storage system status, or when the balancing level cannot be obtained due to the FTRP status (*1).
  - Status
    The balancing status of the FTRP is displayed.
    - Active
      All of the FTVs in the FTRP are either reserved or operating normally
    - Error
      An FTV in error status exists in the FTRP
  - Progress
    The lowest progress rate among the FTV balancing sessions that are being performed in the FTRP is displayed.
  - Error Code
    The error code of FTRP balancing is displayed when an error occurs.
    A "-" (hyphen) is displayed if no errors occur.

*1: The status of the FTRP is not " Available", " Partially Readying", or " Exposed"

7.1.8 Flexible Tier Pool Detail (Flexible Tier Sub Pool)

Click the [No.] link or the [Name] link on the "7.1.5 Flexible Tier Pool (Basic Information)" (page 207) to display the corresponding Flexible Tier Pool Details screen.
Click the [Flexible Tier Sub Pool] tab on the [Flexible Tier Pool Detail] to display a list of Flexible Tier Sub Pools (FTSPs) that are registered in the corresponding FTRP. When no volumes are registered in the FTRP, only the item name is displayed.



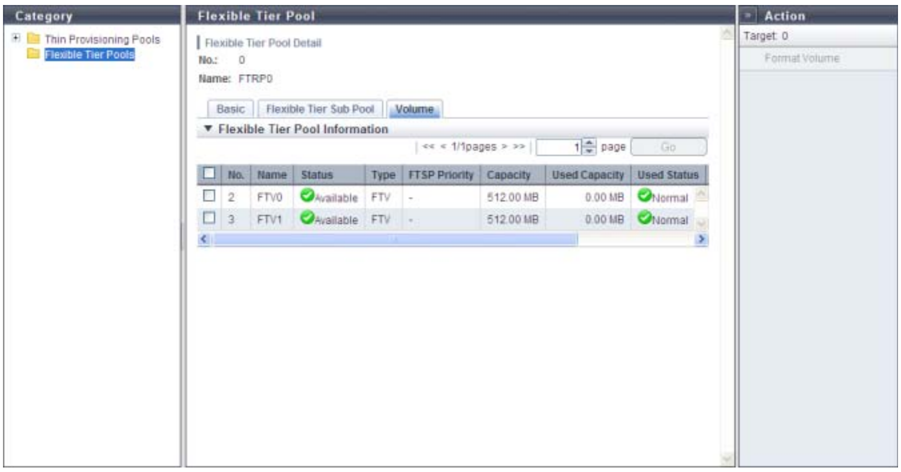
The following items are displayed in the Main area:

- No.
  The FTSP number is displayed. Click this item to display the screen shown in "7.1.10 Flexible Tier Sub Pool Detail (Basic)" (page 217).
- Name
  The FTSP name is displayed. Click this item to display the screen shown in "7.1.10 Flexible Tier Sub Pool Detail (Basic)" (page 217).
- Status
  The FTSP status is displayed. Refer to "B.4 Thin Provisioning Pool Status" (page 976) for detailed information of FTSP status.
- Disk Type
  The type of drive that configures the FTSP is displayed.
  - Online
    SAS disks
  - Nearline
    Nearline SAS disks
  - SSD
  - SED
- RAID Type
  The type of RAID group that configures the FTSP is displayed.
  - High Performance (RAID1+0)
  - High Capacity (RAID5)
  - High Reliability (RAID6)
  - Mirroring (RAID1)
  - Striping (RAID0)

- Total Capacity
  The total capacity of FTSP is displayed.
- Used Capacity
  The used capacity of FTSP is displayed.
- Balancing Level
  The balancing level of the FTSP is displayed.
  A "-" (hyphen) is displayed when the physically allocated capacity cannot be checked due to the storage system status or when the balancing level cannot be obtained due to the FTRP status (*1).
  *1: The status of the FTRP is not " Available", " Partially Readying", or " Exposed"
  - High
    The physically allocated capacity among the RAID groups is equalized.
  - Middle
    The physically allocated capacity among the RAID groups is slightly unequal.
  - Low
    The physically allocated capacity among the RAID groups is significantly unequal.

7.1.9 Flexible Tier Pool Detail (Volume)

Click the [No.] link or the [Name] link on the "7.1.5 Flexible Tier Pool (Basic Information)" (page 207) to display the corresponding Flexible Tier Pool Details screen.
Click the [Volume] tab on the [Flexible Tier Pool Detail] to display a list of volumes that are registered in the corresponding FTRP. Up to 100 volumes are displayed in a page. When no volumes are registered in the FTRP, only the item name is displayed.



The following items are displayed in the Main area:

- No.
  The volume number is displayed.
- Name
  The volume name is displayed.
- Status
  The volume status is displayed. Refer to "B.2 Volume Status" (page 974) for detailed information of volume status.

- Type
  The volume type is displayed.
  This volume list displays only the volumes whose type is "FTV".
- FTSP Priority
  The FTSP number, to which a volume is assigned on a priority basis in the FTRP, is displayed. When the setting is omitted, "-" (hyphen) is displayed.
  - ETERNUS DX80 S2/DX90 S2: 0 - 119
  - ETERNUS DX410 S2: 0 - 239
  - ETERNUS DX440 S2: 0 - 255
  - ETERNUS DX8100 S2: 0 - 47
  - ETERNUS DX8700 S2: 0 - 255
- Capacity
  The total volume capacity is displayed.
- Used Capacity
  The used capacity of the volume is displayed.
- Used Status
  The usage of the volume is displayed.
  - Normal
    The volume usage does not exceed the "Attention" threshold.
  - Attention
    The volume usage exceeds the "Attention" threshold but does not exceed the "Warning" threshold.

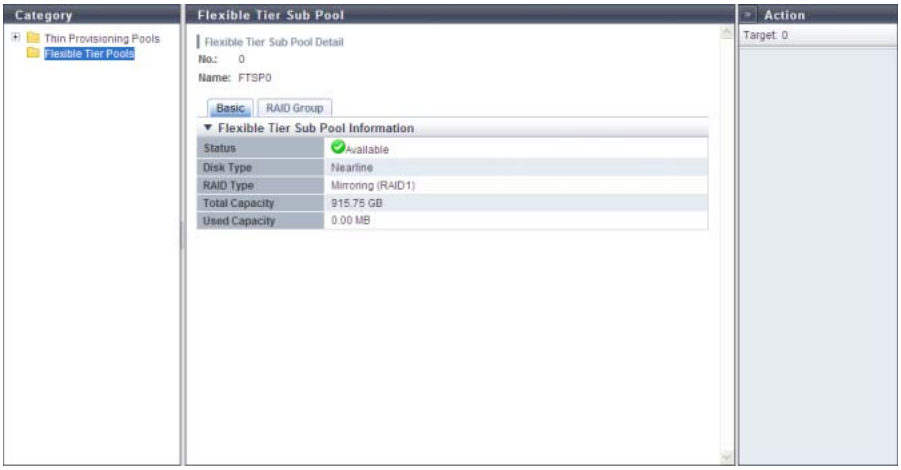
  Volume usage is determined by the ratio of "Free space in the FTRP to which the volume belongs" and "Non-allocated volume capacity × Threshold [%]".
- Measurements
  The FTRP free space status for each volume is displayed.
  The measurement value is calculated by using the following formula: (truncate after the decimal point)

Measurements = FTRP Free Capacity / Non-allocated volume capacity

  A high measurement value indicates that there is more free space in the volume.
  - When the measurement value is larger than 500, ">500" is displayed.
  - When the measurement value is smaller than 1, "0" is displayed.
  - When the non-allocated volume capacity value is "0", "-" (hyphen) is displayed.
  - When the status of the ETERNUS DX Disk storage system is "Not Ready", "?" is displayed.
- Attention
  The attention threshold (%) for monitoring the volume used capacity is displayed.

7.1.10 Flexible Tier Sub Pool Detail (Basic)

Click the [No.] link or the [Name] link on the "7.1.8 Flexible Tier Pool Detail (Flexible Tier Sub Pool)" (page 214) to display the corresponding Flexible Tier Sub Pool Detail screen.
Click the [Basic] tab on the [Flexible Tier Sub Pool Detail] to display the basic information of the corresponding FTSP.



The following items are displayed in the Main area:

- Status
  The FTSP status is displayed. Refer to "B.4 Thin Provisioning Pool Status" (page 976) for detailed information of FTSP status.
- Disk Type
  The type of drive that configures the FTSP is displayed.
  - Online
    SAS disks
  - Nearline
    Nearline SAS disks
  - SSD
  - SED
- RAID Type
  The type of RAID group that configures the FTSP is displayed.
  - High Performance (RAID1+0)
  - High Capacity (RAID5)
  - High Reliability (RAID6)
  - Mirroring (RAID1)
  - Striping (RAID0)
- Total Capacity
  The total capacity of FTSP is displayed.
- Used Capacity
  The used capacity of FTSP is displayed.

7.2 Functions in the Action Area for Thin Provisioning

When using functions in the Action area, select the desired function from the Action area that is displayed in the status display screen.
The functions in the Action area for Thin Provisioning can be performed from the following display functions:

Functions in the Action area for Thin Provisioning	Display function
Create Thin Provisioning Pool	• Thin Provisioning Pool (Basic Information)
Delete Thin Provisioning Pool	
Rename Thin Provisioning Pool	
Expand Thin Provisioning Pool	
Format Thin Provisioning Pool (All Area)	
Format Thin Provisioning Pool (Unformatted Area)	
Modify Threshold Thin Provisioning Pool	• Threshold (Thin Provisioning Pool)
Modify Cache Parameters (Thin Provisioning Pool)	
Assign ECO Mode Schedule (Thin Provisioning Pool)	• ECO Mode Schedule (Thin Provisioning Pool)
Register Thin Provisioning License	• License (Thin Provisioning)
Delete Thin Provisioning License	
Start Balancing Flexible Tier Pool	• Flexible Tier Pool (Basic Information) • Flexible Tier Pool Detail (Basic) • Flexible Tier Pool Detail (Flexible Tier Sub Pool)
Stop Balancing Flexible Tier Pool	

7.2.1 Create Thin Provisioning Pool

This function creates a Thin Provisioning Pool.

The maximum number of TPP and maximum TPP capacity for each model

Model	Maximum Number of TPP (*1)	Maximum TPP Capacity (TB)
ETERNUS DX80 S2	60	128
ETERNUS DX90 S2	120	128
ETERNUS DX410 S2	240	384
ETERNUS DX440 S2	256	768
ETERNUS DX8100 S2	256	768
ETERNUS DX8700 S2	256	1024

*1: Up to 256 TPPs can be created. When the maximum installation number of drives of a model is 512 or less, the maximum number of TPPs is half the maximum installation number of drives.

Caution

- Registering the license for the Thin Provisioning feature is required to create TPP.
- When encryption mode is disabled, TPP encrypted by CM cannot be created.
- Once a TPP has been created, the encryption status cannot be changed.
- TPPs cannot be created in the following conditions:
  - When the maximum number of Thin Provisioning Pools are already registered in the ETERNUS DX Disk storage system
  - When the maximum capacity of Thin Provisioning Pools are already registered in the ETERNUS DX Disk storage system
  - When the resources for creating TPPs (such as the number of RAID groups, the number of volumes, etc.) are insufficient
    (When the maximum number of RAID groups or volumes already exist, TPP cannot be created)

Note

- After a TPP is created, the TPP is formatted automatically. To check the format progress, refer to "7.1.1 Thin Provisioning Pool (Basic Information)" (page 200).
- To expand the TPP capacity after a TPP is created, refer to "7.2.4 Expand Thin Provisioning Pool" (page 231).
- To rename the TPP after a TPP is created, refer to "7.2.3 Rename Thin Provisioning Pool" (page 229).
- To change the TPP threshold after a TPP is created, refer to "7.2.7 Modify Threshold Thin Provisioning Pool" (page 239).

There are two methods to create a TPP: automatic drive selection and manual drive selection.

Automatically selecting drives to create TPPs

To create a new TPP automatically, select Disk Type, RAID Type, and input TPP capacity. The controlling CM of the RAID groups that configure the TPP is determined automatically.
The procedure to create a TPP by selecting drives automatically is as follows:

Procedure

1. Click [Create] in [Action].

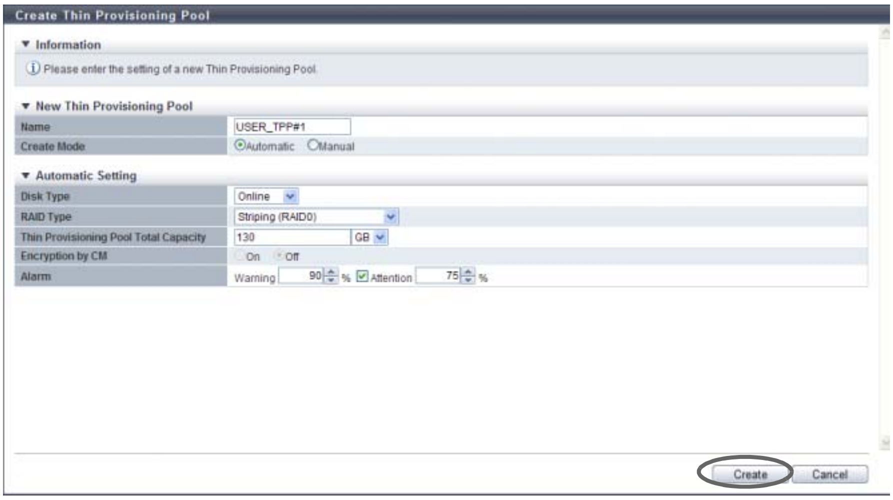
2. Select "Automatic" for the create mode, specify the other parameters, and click the [Create] button.

   - Name
     Input a TPP name. An existing TPP name cannot be specified.
     The following input conditions apply:
     - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")
     - Space
   - Disk Type
     Select the type of drive that configures the TPP from the list box.
     - Online
       SAS disks
     - Nearline
       Nearline SAS disks
     - SSD
     - SED
   - RAID Type
     Select the type of RAID group that configures the TPP from the list box.
     - High Performance (RAID1+0)
       RAID1+0(2D+2M, 4D+4M, 8D+8M, 12D+12M) configuration is available
     - High Capacity (RAID5)
       RAID5(3D+1P, 4D+1P, 7D+1P, 8D+1P, 12D+1P) configuration is available
     - High Reliability (RAID6)
       RAID6(4D+2P, 6D+2P, 8D+2P) configuration is available
     - Mirroring (RAID1)
       RAID1(1D+1M) configuration is available
     - Striping (RAID0)
       RAID0(4D) configuration is available

   Note

   - "Striping (RAID0)" has no data redundancy. Select "High Performance (RAID1+0)", "High Capacity (RAID5)", "High Reliability (RAID6)" or "Mirroring (RAID1)" for the RAID Type.
   - The number of RAID groups that configure a TPP is automatically determined by the selected disk type, the RAID type, the specified total capacity of the Thin Provisioning Pool, and the drives that are installed in the ETERNUS DX Disk storage system.

- Thin Provisioning Pool Total Capacity
  Input a TPP capacity using numeric characters. Select the capacity unit from "TB" or "GB".
  A TPP is automatically created with a capacity of the entered value or higher. Refer to "The maximum number of TPP and maximum TPP capacity for each model" (page 219) for details on the maximum TPP capacity.
- Encryption by CM
  Select the TPP encryption status with the radio button. When the encryption mode is disabled, "On" cannot be selected.
  - On
    Encryption by CM
  - Off
    Unencrypted
- Threshold (%)
  Specify the threshold (%) for monitoring the TPP used capacity.
  There are two types of threshold: "Warning" and "Attention". Specify the threshold so that "Warning" is the same or larger than "Attention". The "Attention" threshold can be omitted. When omitting the "Attention" threshold, clear the checkbox.
  The following input conditions apply:
  - Warning threshold: "5" - "99"
  - Attention threshold: "5" - "80"



→ A confirmation screen appears.

Caution

- An error screen appears in the following conditions:
  - When the "Name" field is not input
  - When the "Name" does not satisfy the input conditions
  - When the "Name" already exists
  - When the "Thin Provisioning Pool Total Capacity" field is not input
  - When the total value of TPP capacity to be created and existing TPP capacity exceeds the maximum TPP capacity for each model
  - When a TPP that meets the specified conditions (disk type, RAID type, and capacity that is equal to or larger than the specified value) cannot be created with the installed drives in the ETERNUS DX Disk storage system

Note

- Specify the threshold so that "Warning" is the same or larger than "Attention".
- The "Attention" threshold can be omitted. When setting the "Attention" threshold, specify a threshold while the checkbox is selected.

3 Click the [OK] button.



→ Create Thin Provisioning Pool starts.

4 Click the [Done] button to return to the [Thin Provisioning Pool] screen.

End of procedure

Manually selecting drives to create Thin Provisioning Pool

To create a new TPP manually, select Disk Type, RAID Type, and the drive that configures the TPP.

The number of member drives in each RAID group

The number of member drives for each RAID type is listed in the following table.

RAID Type	Number of member drives
High Performance (RAID1+0)	4, 8, 16, 24
High Capacity (RAID5)	4, 5, 8, 9, 13
High Reliability (RAID6)	6, 8, 10
Mirroring (RAID1)	2
Striping (RAID0)	4

Caution

- The conditions for RAID groups in the TPP are as follows:
  - The RAID type (High Performance (RAID1+0)/High Capacity (RAID5)/High Reliability (RAID6)/ Mirroring (RAID1)/Striping (RAID0)) must be the same
  - The number of member drives in the RAID group must be the same
  - The disk type (Online/Nearline/SSD/SED) must be the same
    When "Online" is selected for "Disk Type", three types of RAID group can be registered in the TPP. The three available types are a RAID group that is configured with "Online" disks, a RAID group that is configured with "Nearline" disks, and a RAID group that is configured with both "Online" disks and Nearline" disks. In this case, registering RAID groups that are only configured with "Online" disks is recommended to prevent any reduction of TPP access performance.

- The following shows the recommended drive configuration of the RAID group:
  - Select drives with the same capacity. If drives of different capacities exist in a RAID group, the smallest drive becomes the standard, and all other drives are regarded as the same capacity as the smallest drive. In this case, the remaining drive space will NOT be used.
  - Select drives with the same speed. If drives of different speed exist in a RAID group, access performance of the RAID group may be affected.
  - When "High Performance (RAID1+0)" or "Mirroring (RAID1)" is selected for the RAID type, locate the drives (mirroring pair drives) divided into different lines (for ETERNUS DX410 S2/DX440 S2).
  - When "High Capacity (RAID5)" or "High Reliability (RAID6)" is selected for the RAID type, locate the drives (striping multiple drives) divided into two or more lines (for ETERNUS DX410 S2/DX440 S2).
- When using the ETERNUS DX8100 S2/DX8700 S2, the restrictions that apply to the drive layout for RAID group configuration. Refer to "Restrictions of drive layout" (page 179) for details.

The procedure to create a TPP by selecting drives manually is as follows:

Procedure

1 Click [Create] in [Action].

2 Select "Manual" for the create mode, and specify the other parameters.

- Name
  Input a TPP name. An existing TPP name cannot be specified.
  The following input conditions apply:
  - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Spaces
- Disk Type
  Select the type of drive that configures the TPP from the list box. The drives that are installed in the ETERNUS DX Disk storage system is displayed. When "Online" is selected for "Disk Type", "Online" or "Nearline" disks can be selected. In this case, only the use of "Online" disks to configure a TPP is recommended.
  - Online
    SAS disks
  - Nearline
    Nearline SAS disks
  - SSD
  - SED
- RAID Type
  Select the type of RAID group that configures the TPP from the list box. The installed drive determine the selectable RAID types that are displayed as options.
  - High Performance (RAID1+0)
    RAID1+0(2D+2M, 4D+4M, 8D+8M, 12D+12M) configuration is available
  - High Capacity (RAID5)
    RAID5(3D+1P, 4D+1P, 7D+1P, 8D+1P, 12D+1P) configuration is available
  - High Reliability (RAID6)
    RAID6(4D+2P, 6D+2P, 8D+2P) configuration is available
  - Mirroring (RAID1)
    RAID1(1D+1M) configuration is available

- Striping (RAID0)
  RAID0(4D) configuration is available

Note

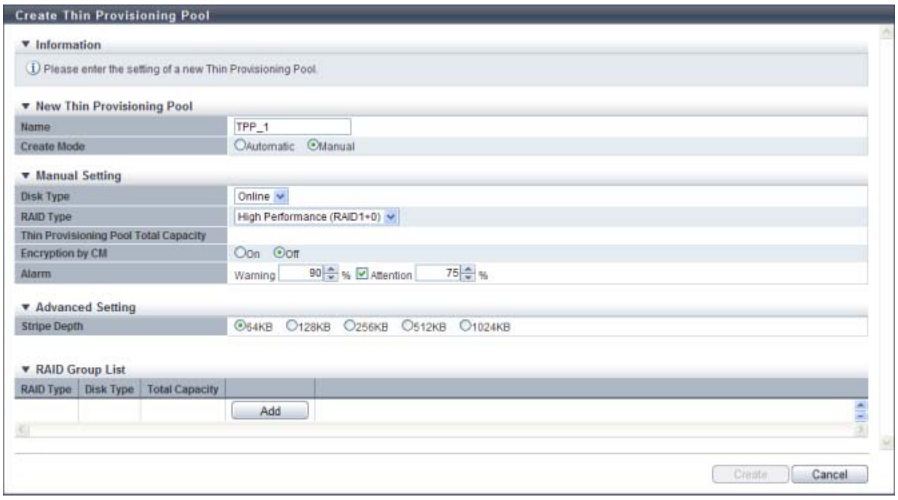
- Refer to "The number of member drives in each RAID group" (page 222) for details on the number of member drives for each RAID type.
- "Striping (RAID0)" has no data redundancy. Select "High Performance (RAID1+0)", "High Capacity (RAID5)", "High Reliability (RAID6)" or "Mirroring (RAID1)" for the RAID type.

- Thin Provisioning Pool Total Capacity
  Total capacity of the TPP created with the selected RAID type and drives is displayed.
  Refer to "The maximum number of TPP and maximum TPP capacity for each model" (page 219) for details on the maximum TPP capacity.
- Encryption by CM
  Select the TPP encryption status with the radio button. When the encryption mode is disabled, "On" cannot be selected.
  - On
    Encryption by CM
  - Off
    Unencrypted
- Alarm
  Specify the threshold (%) for monitoring the TPP used capacity.
  There are two types of threshold: "Warning" and "Attention". Specify the threshold so that "Warning" is the same or larger than "Attention". The "Attention" threshold can be omitted. When omitting the "Attention" threshold, clear the checkbox.
  The following input conditions apply:
  - Warning threshold: "5" - "99"
  - Attention threshold: "5" - "80"

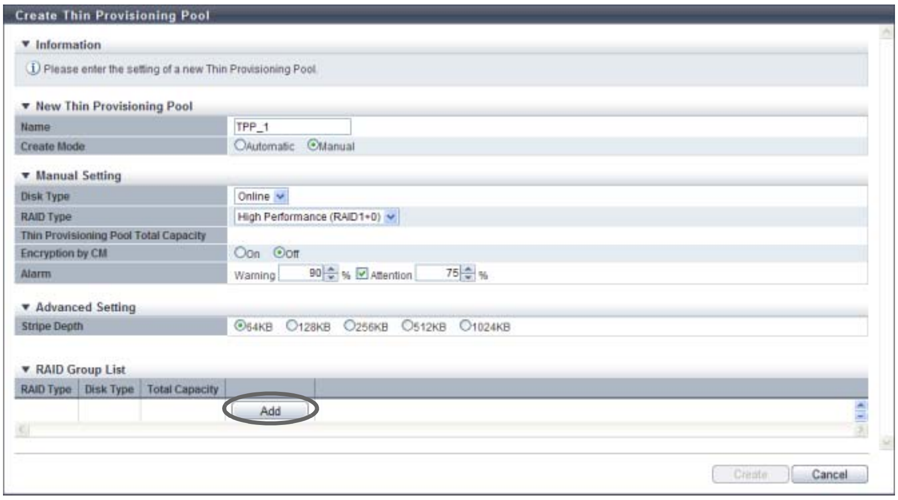
Advanced Settings

Specify the Stripe Depth only when performing the advanced performance tuning for each RAID group that configures a TPP. It is not necessary to change the default setting for normal use.
The higher the Stripe Depth value, the lower the number of drives that access the RAID group. If "High Performance (RAID1+0)" is used, the number of commands that are issued for the drives is reduced and access performance for the relevant RAID group is improved. Note that for "High Capacity (RAID5)", a high Stripe Depth value may reduce the sequential write performance. Also note that restrictions apply for RAID groups and volumes in the RAID group for which Stripe Depth value is changed. Refer to "Restrictions for Stripe Depth modification" (page 228) for details.

- Stripe Depth
  Select the Stripe Depth of RAID group that is to be created.
  When the "RAID Type" is "Mirroring (RAID1)", this setting is not available. When the "RAID Type" is "High Reliability (RAID6)", the value is fixed to "64KB". Available Stripe Depth value varies depending on the RAID type. Refer to "Available Stripe Depth value" (page 228) for details.



3 Click the [Add] button, and set the information of the RAID group that configures the TPP.



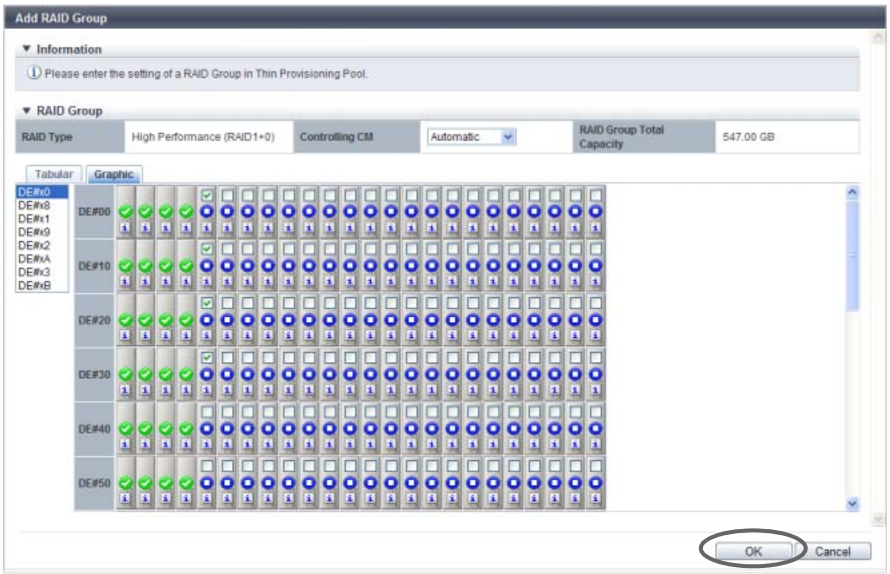
4 Select the controlling CM of the RAID group and all the drives to be registered in the RAID group, and click the [OK] button.

- Controlling CM
  Select the controlling CM and CPU of the RAID group that is to be created.
  "Automatic" and the installed "CM#x CPU#y" in normal status are displayed as options.
  - Automatic
  - CM#x CPU#y (x: CM number, y: CPU number)

  Select "Automatic" for normal operations. When "Automatic" is selected, the CM-CPU that is to be assigned is determined by the RAID group number. Refer to "Appendix F Automatic Controlling CM-CPU Setting" (page 1011) for details.
- Drive Selection
  Select the checkbox for the drive to be selected.
  When using the ETERNUS DX8100 S2/DX8700 S2, the restrictions that apply to the drive layout for RAID group configuration vary depending on the RAID type. Refer to "Restrictions of drive layout" (page 179) for details.

Note

Drives can be selected from the list of drives that is displayed for Tabular or from the drive images that are displayed for Graphic. Click the Tabular tab to display a list of the drives or click the Graphic tab to display drive images.



→ The screen returns to the previous screen. The created RAID group is displayed in the RAID group list.

Caution

An error screen appears in the following conditions:

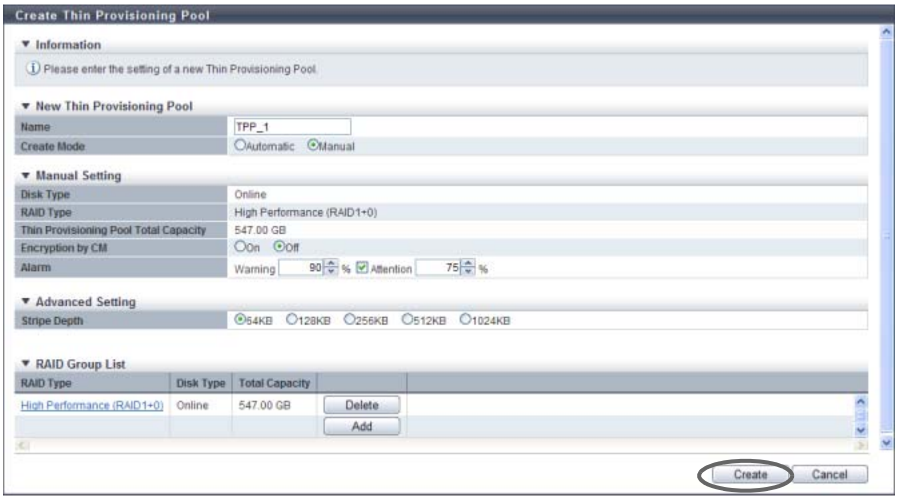
- When the number of selected drives and the number of member drives of the specified RAID type do not match
- When the number of selected drives and the number of member drives of the existing RAID group do not match

Note

- To check the number of member drives of the RAID group, click the [RAID Type] link for the existing RAID group. The drives with the checkbox selected in the displayed screen are the member of the RAID group.
- Click the [RAID Type] link to change the controlling CM and configuration drives of the RAID group.
- Click the [Delete] button to delete a RAID group.

5 When creating multiple RAID groups that configure a TPP, repeat Step 3 and Step 4.

6 After creating a RAID group that configures the TPP, click the [Create] button.



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When the "Name" field is not input
- When the "Name" does not satisfy the input conditions
- When the "Name" already exists
- When the total value of TPP capacity to be created and existing TPP capacity exceeds the maximum TPP capacity for each model
- When the "Stripe Depth" value is a value other than the available value for each RAID type.

Note

- Specify the threshold so that "Warning" is the same or larger than "Attention".
- The "Attention" threshold can be omitted. When setting the "Attention" threshold, specify a threshold while the checkbox is selected.

7 Click the [OK] button.



→ Create Thin Provisioning Pool starts.

8 Click the [Done] button to return to the [Thin Provisioning Pool] screen.

End of procedure

Available Stripe Depth value

The following table shows the available Stripe Depth value for each RAID type.

RAID type	Drive configuration (*1)	Available Stripe Depth value
Mirroring (RAID1)	1D+1M	–
High Performance (RAID1+0)	Any	64KB, 128KB, 256KB, 512KB, 1024KB
Striping (RAID0)		
High Capacity (RAID5)	2D+1P – 4D+1P	64 KB, 128 KB, 256 KB, 512 KB
	5D+1P – 8D+1P	64 KB, 128 KB, 256 KB
	9D+1P – 15D+1P	64 KB, 128 KB
High Reliability (RAID6)	Any	64 KB

Restrictions for Stripe Depth modification

The following restrictions are applied for RAID groups for which the Stripe Depth value is changed.

- Stripe depth for RAID groups that configure the existing TPPs cannot be changed.
- When selecting drives automatically to create a TPP, the Stripe Depth cannot be changed.

7.2.2 Delete Thin Provisioning Pool

This function deletes a Thin Provisioning Pool.

Caution

- TPPs that have volumes registered cannot be deleted. When deleting a TPP, delete the volumes beforehand. To delete a volume, refer to "5.2.2 Delete Volume" (page 112).
- This function cannot be used under the following conditions:
  - When no TPP is registered
  - When all the TPPs have volumes registered

Note

After deleting a TPP, all the RAID groups that configure the TPP are also deleted.

The procedure to delete a Thin Provisioning Pool is as follows:

Procedure

1 Select the TPP to be deleted (multiple selections can be made) and click [Delete] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ Delete Thin Provisioning Pool starts.

3 Click the [Done] button to return to the [Thin Provisioning Pool] screen.

End of procedure

7.2.3 Rename Thin Provisioning Pool

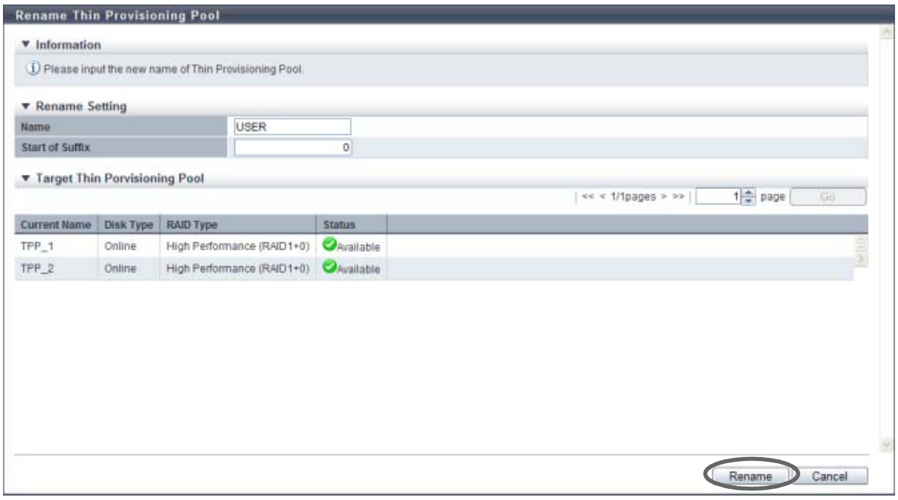
This function changes a Thin Provisioning Pool name.
Multiple TPPs can be renamed with a single operation.
The procedure to rename TPP is as follows:

Procedure

1 Select the TPP to be renamed (multiple selections can be made) and click [Rename] in [Action].

2 Input the new TPP name and the suffix starting number (only when multiple TPPs are selected), and click the [Rename] button.

- Name
  Input a new TPP name. An existing TPP name cannot be specified.
  The following input conditions apply:
  - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space
- Start of Suffix
  Input the starting number of the suffix that is to be added to the new TPP name.
  When changing multiple TPP names, the suffix number is added to the TPP names with consecutive numbers in ascending order starting with the entered suffix number.
  Refer to "Naming conventions for renaming volumes" (page 993) for details.
  When changing only one TPP name, the "Start of Suffix" field is not displayed.
  The following input conditions apply:
  - Numeric characters ("0" - "99999")
  - Decimal number
  - 1 - 5 digits



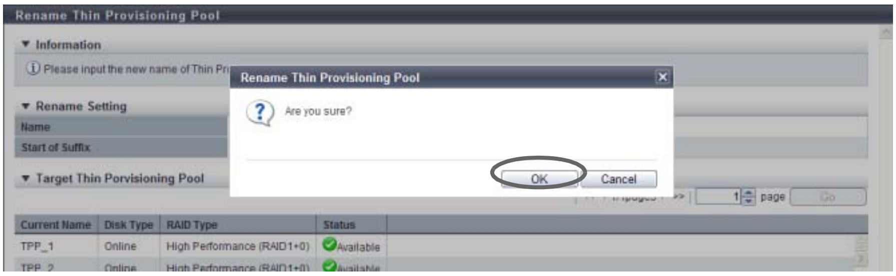
→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When a TPP name is not input
- When an existing TPP name is input
- When the value in the "Name" does not satisfy the input conditions (when one TPP is selected)
- When the "Start of Suffix" is not specified (when multiple TPPs are selected)
- When the value in the "Start of Suffix" does not satisfy the input conditions (when multiple TPPs are selected)

3 Click the [OK] button.



→ Rename Thin Provisioning Pool starts.

4 Click the [Done] button to return to the [Thin Provisioning Pool] screen.

End of procedure

7.2.4 Expand Thin Provisioning Pool

This function expands the capacity of Thin Provisioning Pool.

The maximum number of TPP and maximum TPP capacity for each model

Model	Maximum Number of TPP (*1)	Maximum TPP Capacity (TB)
ETERNUS DX80 S2	60	128
ETERNUS DX90 S2	120	128
ETERNUS DX410 S2	240	384
ETERNUS DX440 S2	256	768
ETERNUS DX8100 S2	256	768
ETERNUS DX8700 S2	256	1024

*1: Up to 256 TPPs can be created. When the maximum installation number of drives of a model is 512 or less, the maximum number of TPPs is half the maximum installation number of drives.

Caution

- TPP capacity is expanded in units of RAID groups. The specifications for a RAID group (such as the RAID type, the disk type, and the number of member drives) that is to be added are the same as the existing RAID group.
- TPP capacity cannot be expanded in the following conditions:
  - When the maximum capacity of TPPs are already registered in the ETERNUS DX Disk storage system
  - When resources for creating TPPs (such as the number of RAID groups and volumes) are insufficient (When the maximum number of RAID groups or volumes already exist, TPP cannot be expanded)

Note

After a TPP capacity is expanded, the expanded area of TPP is formatted automatically. To check the format progress, refer to "7.1.1 Thin Provisioning Pool (Basic Information)" (page 200).

There are two methods to expand a TPP: automatic drive selection and manual drive selection.

Automatically selecting drives to expand a TPP

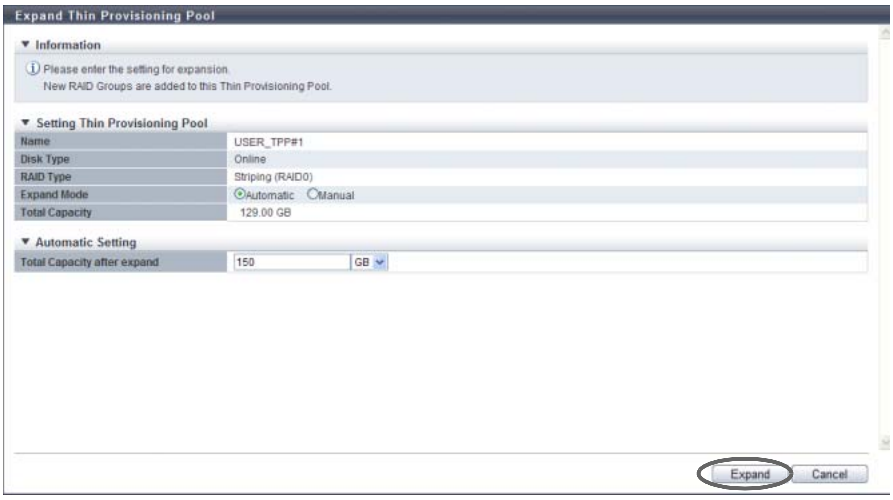
The procedure to expand a TPP by selecting drives automatically is as follows:

Procedure

1 Select the TPP to be expanded and click [Expand] in [Action].

2 Select "Automatic" for the expansion mode, specify the TPP capacity after expanded, and click the [Expand] button.

- Total Capacity after expand
  Input the TPP total capacity in numeric characters after expansion is performed and select the units of capacity from "TB", "GB", or "MB".
  Drives are automatically selected according to the existing RAID group specifications, and the TPP capacity is expanded to the entered value or higher. Refer to "The maximum number of TPP and maximum TPP capacity for each model" (page 219) for details on the maximum TPP capacity.



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When the capacity is not specified for "Total Capacity after expand"
- When the entered value in the "Total Capacity after expand" is equal to or lower than the existing capacity
- When the total value of TPP capacity after expanded and existing TPP capacity exceeds the maximum TPP capacity for each model
- When the TPP cannot be expanded over the specified capacity in the drive installed in the ETERNUS DX Disk storage system

3 Click the [OK] button.



→ Expand Thin Provisioning Pool starts.

4 Click the [Done] button to return to the [Thin Provisioning Pool] screen.

End of procedure

Manually selecting drives to expand a TPP

Select drives manually to expand the TPP.
Check the specifications of the existing RAID groups (number of member drives and disk type) in the TPP in advance. For the details on how to check the specifications, refer to "Check the RAID group specifications" (page 234).

Caution

- The conditions for RAID groups in the TPP are as follows:
  - The RAID type (High Performance (RAID1+0)/High Capacity (RAID5)/High Reliability (RAID6)/Mirroring (RAID1)/Striping (RAID0)) must be the same
  - The number of member drives in the RAID group must be the same
  - The disk type (Online/Nearline/SSD/SED) must be the same
    (When "Online" is selected for "Disk Type", three types of RAID group may be registered in the TPP. The three available types are a RAID group that is configured with "Online" disks, a RAID group that is configured with "Nearline" disks, and a RAID group that is configured with both "Online" disks and Nearline" disks. In this case, registering RAID groups that are only configured with "Online" disks is recommended to prevent any reduction of TPP access performance.)
- The following shows the recommended drive configuration of the RAID group;
  - Select drives with the same capacity. If drives of different capacities exist in a RAID group, the smallest drive becomes the standard, and all other drives are regarded as the same capacity as the smallest drive. In this case, the remaining drive space will NOT be used.
  - Select drives with the same speed. If drives of different speed exist in a RAID group, access performance of the RAID group may be affected.
  - When "High Performance (RAID1+0)" or "Mirroring (RAID1)" is selected for the RAID type, locate the drives (mirroring pair drives) divided into different lines (for ETERNUS DX410 S2/DX440 S2).
  - When "High Capacity (RAID5)" or "High Reliability (RAID6)" is selected for the RAID type, locate the drives (striping multiple drives) divided into two or more lines (for ETERNUS DX410 S2/DX440 S2).
- When using the ETERNUS DX8100 S2/DX8700 S2, the restrictions that apply to the drive layout for RAID group configuration vary depending on the RAID type. Refer to "Restrictions of drive layout" (page 179) for details.

Note

The same Stripe Depth value as the existing RAID groups is applied for the newly added RAID group.

Check the RAID group specifications

Check the specifications of the existing RAID groups (number of member drives and disk type) in the TPP in advance. The following describes how to check the specifications.

(1) From the TPP list in "7.1.1 Thin Provisioning Pool (Basic Information)" (page 200), click the [Name] link for the TPP that is to be expanded.

(2) The basic information of the TPP is displayed. Click the [RAID Group] tab to switch the display.

(3) The list of RAID groups that configure the TPP is displayed. Click the [Name] link for the RAID group. Any RAID group can be specified because the RAID groups in the TPP have the same specifications.

(4) Click the [Disk] tab in the [RAID Group Detail] screen. Check the disk type and the number of member drives that configure the RAID group.

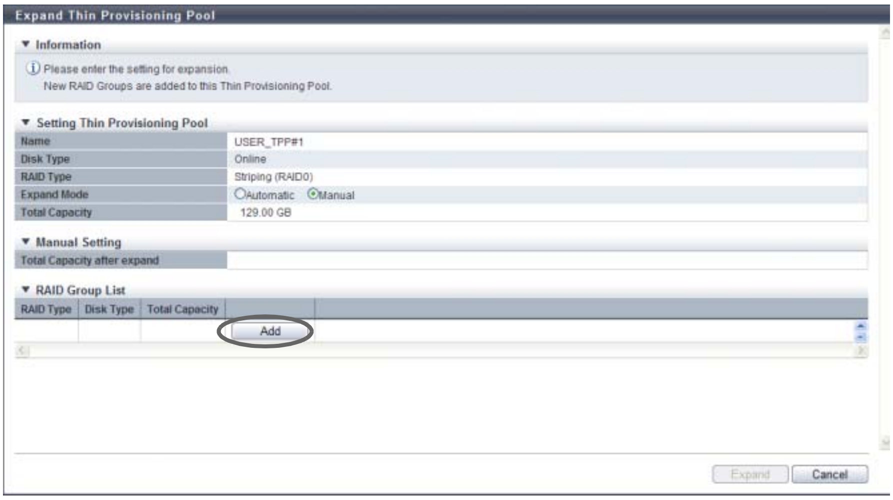
The procedure to expand a TPP by selecting drives manually is as follows:

Procedure

1 Select the TPP to be expanded and click [Expand] in [Action].

2 Select "Manual" for expansion mode.

3 Click the [Add] button and set the information of the RAID group to be added to the TPP.



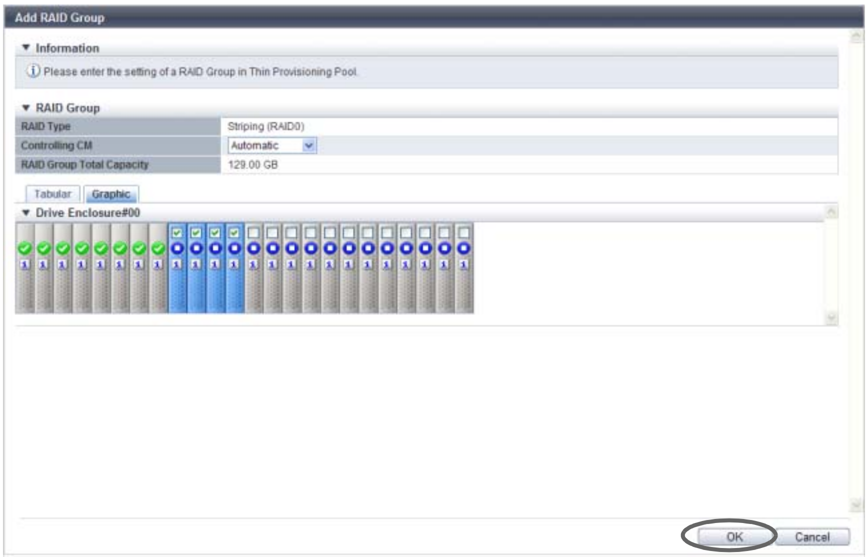
4 Select the controlling CM of the RAID group and all the drives to be registered in the RAID group, and click the [OK] button.

- Controlling CM
  Select the controlling CM and CPU of the RAID group that is to be created.
  "Automatic" and the installed "CM#x CPU#y" in normal status are displayed as options.
  - Automatic
  - CM#x CPU#y (x: CM number, y: CPU number)

  Select "Automatic" for normal operations. When "Automatic" is selected, the CM-CPU that is to be assigned is determined by the RAID group number. Refer to "Appendix F Automatic Controlling CM-CPU Setting" (page 1011) for details.
- Drive Selection
  Select the checkbox for the drive to be selected.
  When using the ETERNUS DX8100 S2/DX8700 S2, the restrictions that apply to the drive layout for RAID group configuration vary depending on the RAID type. Refer to "Restrictions of drive layout" (page 179) for details.

Note

Drives can be selected from the list of drives that is displayed for Tabular or from the drive images that are displayed for Graphic. Click the Tabular tab to display a list of the drives or click the Graphic tab to display drive images.



→ The screen returns to the previous screen. The added RAID group is displayed in the RAID group list.

Caution

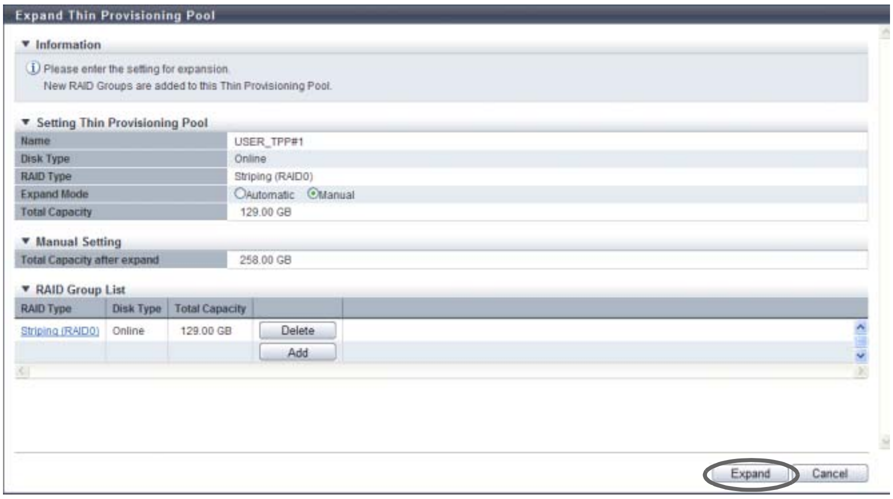
When the number of selected drives is not an integral multiple of the number of member drives for the RAID group, the [OK] button cannot be clicked.

Note

- Click the [RAID Type] link to change the controlling CM and configuration drives of the newly added RAID group.
- Click the [Delete] button in the target RAID group area to delete the newly added RAID group.

5 When creating multiple RAID groups, repeat Step 3 and Step 4.

6 After creating a RAID group to be added to the TPP, click the [Expand] button.

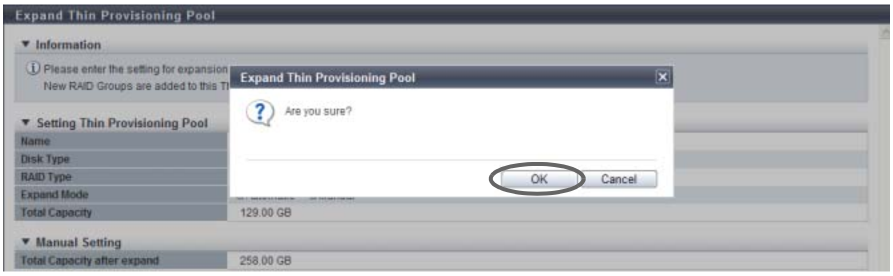


→ A confirmation screen appears.

Caution

When the total value of TPP capacity after expanded and existing TPP capacity exceeds the maximum TPP capacity for each model, an error screen is displayed.

7 Click the [OK] button.



→ Expand Thin Provisioning Pool starts.

8 Click the [Done] button to return to the [Thin Provisioning Pool] screen.

End of procedure

7.2.5 Format Thin Provisioning Pool (All Area)

This function formats all of the areas in the Thin Provisioning Pool.

Caution

- When formatting all area in the TPPs, data stored in the Thin Provisioning Volumes in TPP will be deleted. Format TPV to use them again, after deleting data.
- When a TPP is created using the procedure in "7.2.1 Create Thin Provisioning Pool" (page 219), the TPP is formatted automatically. In this case, it is not necessary to format the TPP by using this function.
- An error will stop the balancing TPV when a TPP, in which the currently balancing TPV belongs, is formatted. Start TPP formatting after balancing TPV is complete.
- An error will stop the RAID migration when a TPP, in which the currently migrating TPV belongs, is formatted. Start TPP formatting after RAID migration is complete.
- This function cannot be used under the following conditions:
  - When no TPP is registered
  - When there is no TPP that can be formatted

Note

- TPPs in " Available", " Partially Readying", " Readying", or " Exposed" status can be formatted.
- To check the format progress, refer to "7.1.1 Thin Provisioning Pool (Basic Information)" (page 200). Click the TPP name to see the basic information.
- To format a TPV, refer to "5.2.4 Format Volume" (page 116).

The procedure to format all of the areas in the Thin Provisioning Pool is as follows:

Procedure

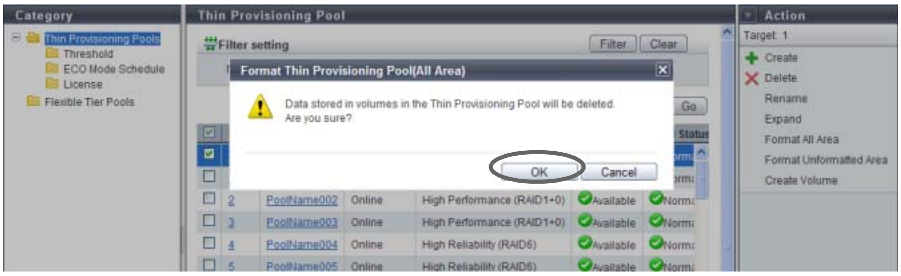
1 Select the TPP that is to be formatted (multiple selections can be made) and click [Format All Area] in [Action].

→ A confirmation screen appears.

Caution

- When formatting all area in the TPPs, data stored in the TPVs in TPP will be deleted.
- An error will stop the balancing TPV when a TPP, in which the currently balancing TPV belongs, is formatted.
- An error will stop the RAID migration when a TPP, in which the currently migrating TPV belongs, is formatted.

2 Click the [OK] button.



→ Format all area in the Thin Provisioning Pool starts.

3 Click the [Done] button to return to the [Thin Provisioning Pool] screen.

Caution

To use a TPV in the TPP again after formatted with "All Area" selected for the mode, format the TPV.

End of procedure

7.2.6 Format Thin Provisioning Pool (Unformatted Area)

This function formats unformatted area in the Thin Provisioning Pool.

Caution

This function cannot be used under the following conditions:

- When no TPP is registered
- When there is no TPP that can be formatted
- When the status of all the TPPs that are to be formatted is " Available".

Note

- TPPs in " Partially Readying", or " Readying" status can be formatted. Data stored in the TPVs of the target TPP are not deleted. The "Unformatted area" is a new area that is added to a TPP by the capacity expansion function.
- To check the format progress, refer to "7.1.1 Thin Provisioning Pool (Basic Information)" (page 200). Click the TPP name to see the basic information.

The procedure to format an unformat area in the Thin Provisioning Pool is as follows:

Procedure

1 Select the TPP to be formatted (multiple selections can be made) and click [Format Unformatted Area] in [Action].
→ A confirmation screen appears.

2 Click the [OK] button.



→ Format of unformat area in the Thin Provisioning Pool starts.

3 Click the [Done] button to return to the [Thin Provisioning Pool] screen.

End of procedure

7.2.7 Modify Threshold Thin Provisioning Pool

This function changes the threshold for monitoring the used capacity of Thin Provisioning Pool. There are two types of threshold: "Warning" and "Attention".

Caution

This function cannot be performed when there are no TPPs in the ETERNUS DX Disk storage system.

Note

- This function changes the threshold of a TPP that is created by using the procedure in "7.2.1 Create Thin Provisioning Pool" (page 219).
- The same threshold can be applied for multiple TPP in a single operation.

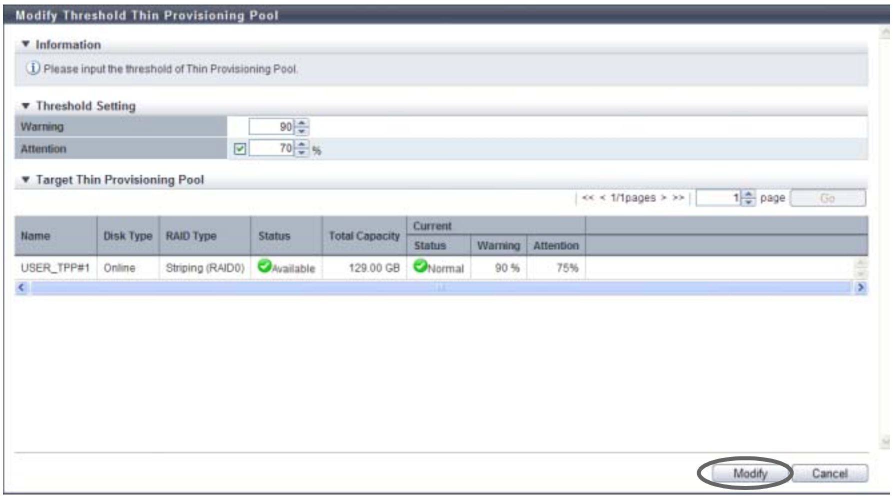
The procedure to change the threshold of a TPP is as follows:

Procedure

1 Select the TPP for which the threshold is to be changed (multiple selections can be made) and click [Modify Threshold] in [Action].

2 Select a new threshold, and click the [Modify] button.

- Warning
  Change the warning threshold (%) for monitoring the TPP used capacity between 5 and 99.
  Specify the warning threshold so that the "Warning" threshold is the same or larger than the "Attention" threshold.
- Attention
  Specify the attention threshold (%) for monitoring the TPP used capacity between 5 and 80.
  Specify the Attention threshold so that the "Warning" threshold is the same or larger than the "Attention" threshold.
  The "Attention" threshold can be omitted. When setting the "Attention" threshold, select the checkbox.



→ A confirmation screen appears.

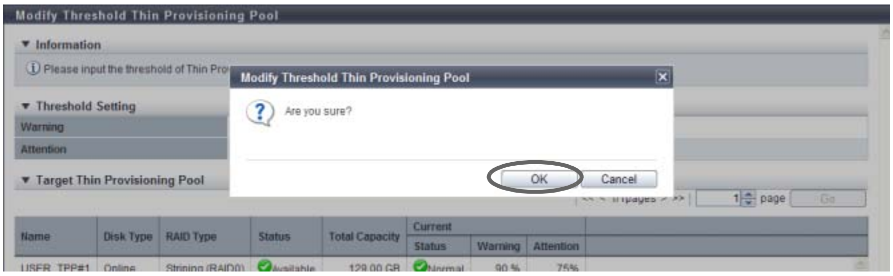
Caution

When "Warning" is smaller than "Attention", an error screen is displayed.

Note

- When changing a "Attention" threshold, select the checkbox and then specify a new threshold.
- When omitting a "Attention" threshold, clear the checkbox.

3 Click the [OK] button.



→ Modify Threshold starts.

4 Click the [Done] button to return to the [Thin Provisioning Pool] screen.

End of procedure

7.2.8 Modify Cache Parameters (Thin Provisioning Pool)

This function changes the cache parameters of each Thin Provisioning Pool.
Device performance varies depending on the cache hit ratio. The cache hit ratio can be improved by detecting the sequentiality for a Read/Write request from the host and reading continuous data in advance. The characteristics of Read/Write requests from the host depends on the system. Device performance may improve by specifying a cache parameter that is suitable for the system that is being used.

The following parameter can be specified:

- Multi Writeback Count (MWC)
  Specify the number of processes that can be written back at the same time.

Caution

If pinned data exists in the ETERNUS DX Disk storage system, MWC cannot be configured.

Note

- The same cache parameter can be applied for multiple TPPs in a single operation.
- Cache parameters other than MWC are specified for each TPV. Refer to "5.2.18 Modify Cache Parameters" (page 148) for details.

The procedure to modify cache parameters is as follows:

Procedure

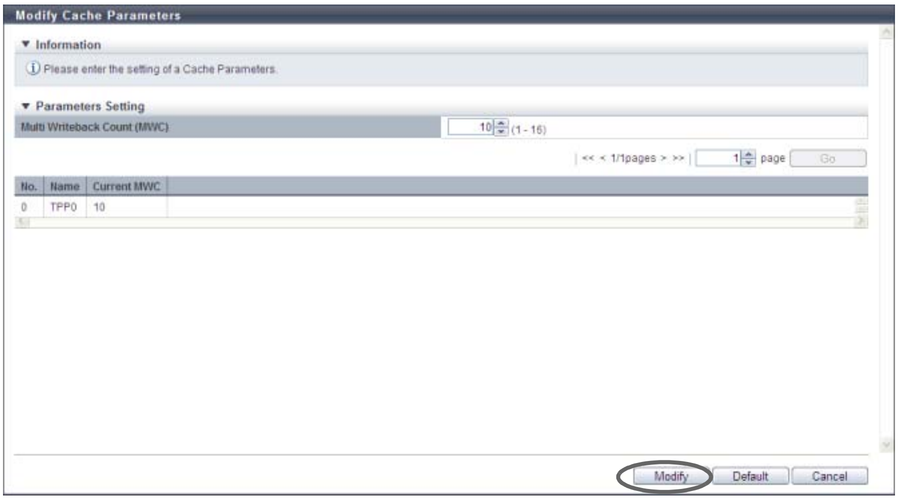
1 Select which TPP to change the cache parameters for (multiple selections can be made) and click [Modify Cache Parameters] in [Action].

2 Change the cache parameters and click the [Modify] button.

- Multi Writeback Count (MWC)
  Specify the Multi Writeback Count.
  When specifying a larger "Multi Writeback Count" value, sequential write access performance is improved. Note that this is not effective when a number of random write accesses occur. Depending on the ratio of read access and write access, read access performance may be reduced.

Note

The setting values that are available for Multi Writeback Count vary depending on the RAID type and drive configuration. Refer to "E.2 Input Conditions for MWC" (page 1007) for details.



→ A confirmation screen appears.

Note

If the [Default] button is clicked before the [Modify] button, the default cache parameters are restored.

3 Click the [OK] button.



→ The cache parameter modification starts.

4 Click the [Done] button to return to the [Threshold] screen.

End of procedure

7.2.9 Assign ECO Mode Schedule (Thin Provisioning Pool)

This function applies the ECO mode schedule to the Thin Provisioning Pools (TPP) and enables the ECO mode setting.
ECO mode is a function to reduce power consumption by stopping motor of disks that configure the TPP while the TPP is not accessed from the host.
When the ECO mode schedule is applied to a TPP, the ECO mode setting is enabled. When ECO mode is running, disk motors are activated during the scheduled event term. During times other than the scheduled time, disk motors are stopped.
If the TPP is accessed from the host while the disk motors are stopped, the disk motors are activated and can be accessed within 1 - 5 minutes.

<table>
<tr><th colspan="3" rowspan="2">ECO Mode Schedule Setting</th><th colspan="2">ECO Mode General Setting</th></tr>
<tr><th>Enabled</th><th>Disabled</th></tr>
<tr><td rowspan="3">Control Status</td><td rowspan="2">ON</td><td>During scheduled event term</td><td>Disk motor is activated. (ECO mode is running)</td><td rowspan="5">Disk motor runs regardless of schedule settings. (ECO mode is not running)</td></tr>
<tr><td>Times other than scheduled event term</td><td>Disk motor is stopped. (ECO mode is running)
If the RAID group is accessed, disk motors are activated within 1 - 5 minutes.</td></tr>
<tr><td colspan="2">OFF</td><td>The target disk motor is operating constantly. (ECO mode is not running)</td></tr>
<tr><td colspan="3">Schedule is not applied</td><td>Disk motor is operating constantly. (ECO mode is not running)</td></tr>
<tr><td colspan="3">Disks not registered in the TPPs</td><td>Disk motor is stopped constantly. (ECO mode is running)</td></tr>
</table>

Caution

- Before applying ECO mode for TPPs, use the procedure in "11.2.8.1 Modify ECO Mode General Setting" (page 869) to enable the ECO mode setting for the ETERNUS DX Disk storage system.
- Set the ECO mode schedule using the procedure in "11.2.8.4 Modify ECO Mode Schedule" (page 876).
- This function cannot be used under the following conditions:
  - No volumes are created
  - Configured by SSDs
- When using ECO mode, make sure to set the time/date correctly. If the time/date of the ETERNUS DX Disk storage system is wrong, processes used for stopping and starting the disk motor cannot be performed per the ECO mode schedule.
- If any of the following conditions occur during the ECO mode scheduled time, the disk will be started even when the disk motor is inactive. Note that the ECO mode schedule will be re-enabled when the following conditions have finished.
  - When the target TPP status is not " Available"
  - When performing functions that change the TPP or the volume configuration
  - When performing rebuild or copyback in the RAID groups that configure the target TPP
  - When formatting is being performed in the TPP
  - When RAID migration is being performed in the volumes registered in the TPP
  - When Advanced Copy is being performed in the volume registered in the TPP (copy session status is not "Suspend" or "Tracking")
  - During maintenance
  - When performing disk diagnosis, TPP diagnosis (diagnosing the RAID groups that configure the TPP), or when exporting G-List
  - When a module error related to the access paths of the Controller Modules and drives is detected

Note

- When the ECO mode is set to TPP, the same ECO Mode schedule is set for all the RAID groups configuring the TPP.
- When selecting multiple TPPs as the target of the ECO mode, the same ECO mode schedule can be specified for all the selected TPPs.

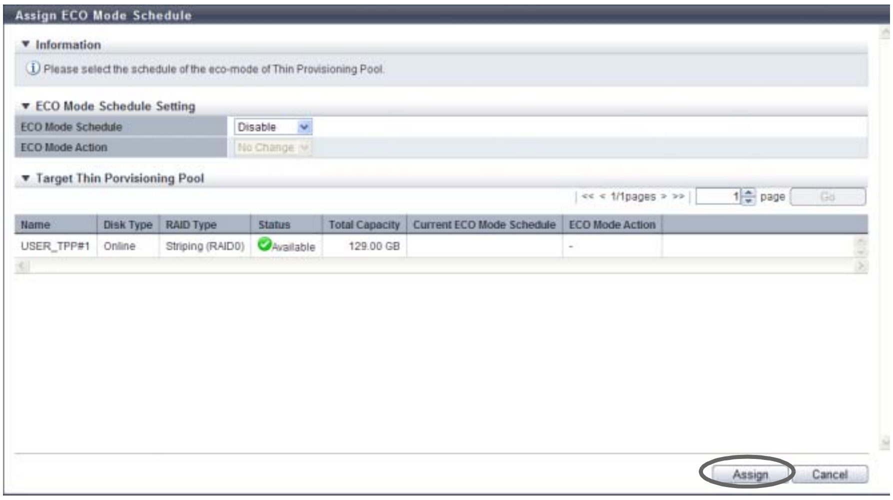
The procedure to set the ECO mode for Thin Provisioning Pool is as follows:

Procedure

1 Select the TPP for which the ECO mode setting status is to be changed (multiple selections can be made) and click [Assign ECO Mode] in [Action].

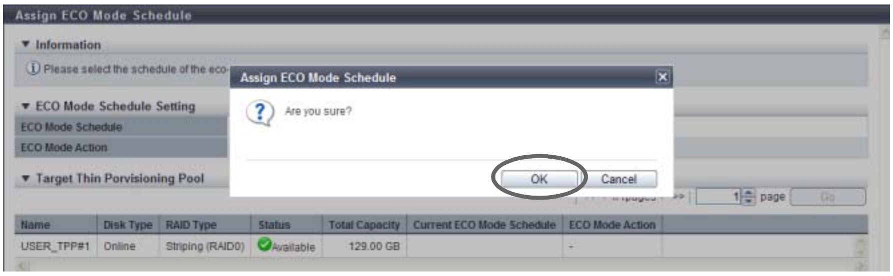
2 Select the ECO mode schedule and action to be assigned and click the [Assign] button.

- ECO Mode Schedule
  Select the ECO mode schedule that is to be applied.
  - No Change
    Do not change the current setting.
  - Disable
    Disable the ECO mode.
  - ECO mode schedule name
    Apply the selected ECO mode schedule.
- ECO Mode Action
  Select whether to enable ("ON") or disable ("OFF") the ECO mode setting. Select "No Change" to use the current setting.
  - No Change
    Do not change the current setting.
  - ON
    Enable the ECO mode.
  - OFF
    Disable the ECO mode.



→ A confirmation screen appears.

3 Click the [OK] button.



→ Assign ECO Mode starts.

4 Click the [Done] button to return to the [Thin Provisioning Pool] screen.

End of procedure

7.2.10 Register Thin Provisioning License

This function registers the Thin Provisioning License.

Caution

- If a Thin Provisioning license is not registered, the Thin Provisioning function cannot be used.
- If a Thin Provisioning license is already registered, this function cannot be used.

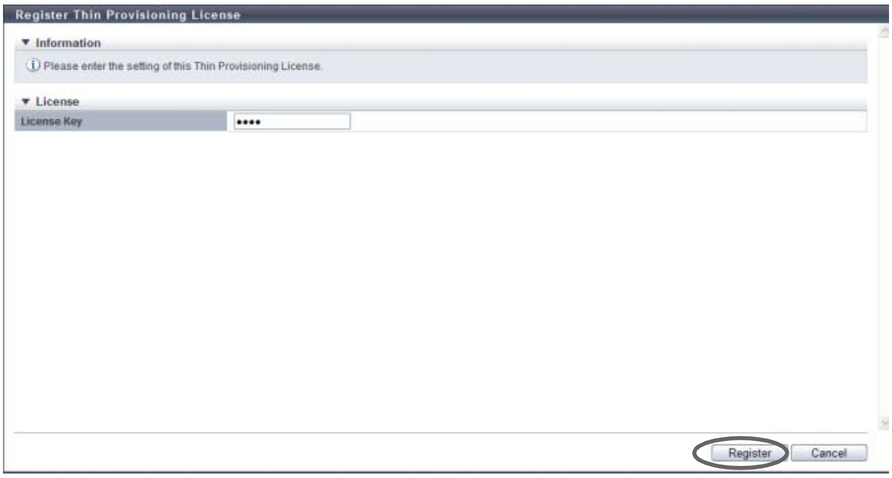
The procedure to register a Thin Provisioning License is as follows:

Procedure

1 Click [Register License] in [Action].

2 Input the Thin Provisioning license key, and click the [Register] button.

- License Key
  Input the Thin Provisioning license key.
  The following input condition applies:
  - Up to 16 capital letters and numeric characters

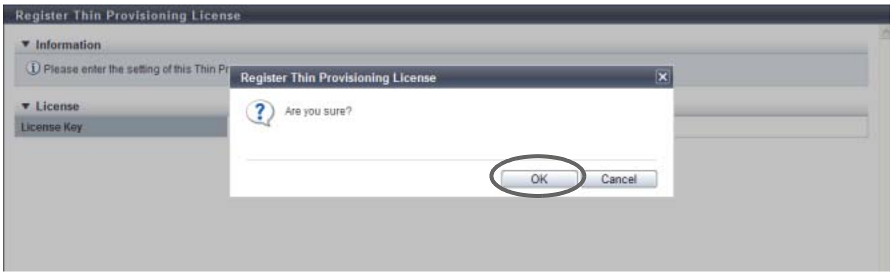


→ A confirmation screen appears.

Caution

If the entered Thin Provisioning license key does not satisfy the input conditions, an error screen appears.

3 Click the [OK] button.



→ Registration of the Thin Provisioning License starts.

4 Click the [Done] button to return to the [License] screen.

End of procedure

7.2.11 Delete Thin Provisioning License

This function deletes a Thin Provisioning license.

Caution

Thin Provisioning license cannot be deleted in the following conditions:

- When no Thin Provisioning license is registered
- When Thin Provisioning Pool is registered
- When "TPV balancing" is selected for "Thin Provisioning Allocation Mode" of the subsystem parameter
- When the Flexible Tier function mode is enabled

Note

A Thin Provisioning license cannot be deleted when "TPV balancing" is selected for "Thin Provisioning Allocation Mode" of the subsystem parameter. Before deleting the Thin Provisioning license, use the procedure described in "11.2.13.4 Setup Subsystem Parameters" (page 935) to reset the "Thin Provisioning Allocation Mode" setting to the default "TPP balancing" setting.

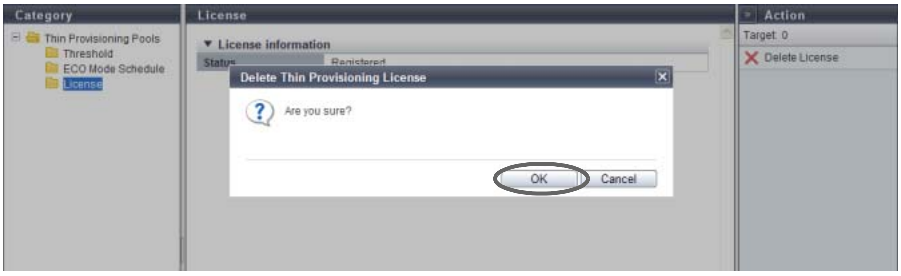
The procedure to delete a Thin Provisioning License is as follows:

Procedure

1 Click [Delete License] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ Delete Thin Provisioning License starts.

3 Click the [Done] button to return to the [License] screen.

End of procedure

7.2.12 Start Balancing Flexible Tier Pool

This function starts Flexible Tier Pool (FTRP) balancing sessions.
The FTRP balancing function equalizes unevenly allocated physical area in the Flexible Tier Sub Pools (FTSPs) that configure an FTRP. By using this function, the physical allocated areas are reallocated equally among the RAID groups in the FTSPs. The I/O access to the FTV is distributed almost equally to the RAID groups in the FTSP.

Requirements for an FTRP to be balanced

- The status of the FTRP is " Available", " Partially Readying", or " Exposed"
- Balancing of the selected FTRP is not being performed
- Free space, which can be used for balancing, exists in the FTSPs in the target FTRP

Caution

- Even after the FTRP balancing session is performed, the physical allocation between the FTVs and the FTSPs does not change.
- The FTRP balancing function extracts up to 32 balanceable FTVs (*1) that have a low balancing level from the selected FTRP and performs balancing sessions in the FTSPs. Note that FTVs are not extracted as balancing targets in certain conditions. For example, FTVs with a high balancing level, FTVs that are undergoing RAID migration, or FTVs that are undergoing Zero Reclamation.

  *1: Up to 32 sessions, which include FTV balancing sessions, TPV balancing sessions, and RAID migration sessions, can be performed at the same time. An FTRP balancing session is performed in each FTRP. Note that the number of FTV balancing sessions that are performed at the same time cannot be specified.
- Balancing of FTVs in the following conditions is not available:
  - FTVs which capacity is less than 20GB
  - FTVs which used capacity is less than 10GB

  The FTV capacity can be checked in the [Flexible Tier Pool Detail (Volume)] screen. Refer to "7.1.9 Flexible Tier Pool Detail (Volume)" (page 215) for details.
- FTRP balancing cannot be started in the following conditions:
  - When the Thin Provisioning license is not registered
  - When the Flexible Tier function mode is disabled
  - When the maximum number of volumes is already registered in the ETERNUS DX Disk storage system
  - When the total number of TPV balancing processes and RAID migrations that are running in the ETERNUS DX Disk storage system is 32
  - When the total capacity for the TPV balancing processes and the RAID migrations that are running in the ETERNUS DX Disk storage system is 128TB
  - When the RAID group diagnosis is being performed in the ETERNUS DX Disk storage system
  - When the disk diagnosis is being performed in the ETERNUS DX Disk storage system
  - When Zero Reclamation is being performed for all of the balancing target FTVs in the FTRP
- When FTRP balancing is performed, the used FTRP capacity may temporarily exceed the threshold. If the used capacity exceeds the threshold, " Attention" or " Warning" is displayed in the "Used Status" field for the FTRP. The usage of the FTRPs is displayed in the [Flexible Tier Pool] screen. Refer to "7.1.5 Flexible Tier Pool (Basic Information)" (page 207) for details.

Note

- FTRP balancing can be performed during the work I/O.
- The balancing levels of FTRPs and FTSPs, and the progress of the FTRP balancing sessions can be checked. Refer to "7.1.5 Flexible Tier Pool (Basic Information)" (page 207), "7.1.7 Flexible Tier Pool Detail (Basic)" (page 212), and "7.1.8 Flexible Tier Pool Detail (Flexible Tier Sub Pool)" (page 214)for details.
- The progress of a balancing FTV can be checked in the [Volume Detail] screen. Refer to "5.1.1 Volume (Basic Information)" (page 74) for details.

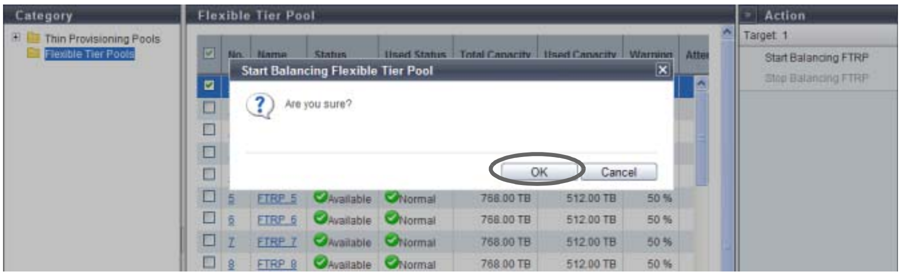
The procedure to start balancing FTRP is as follows:

Procedure

1 Select the FTRP for which balancing is to be started and click [Start Balancing FTRP] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ FTRP balancing starts.

3 Click the [Done] button to return to the [Flexible Tier Pool] screen.

End of procedure

7.2.13 Stop Balancing Flexible Tier Pool

This function stops Flexible Tier Pool (FTRP) balancing sessions.

Caution

- This function cannot be used when no FTRPs are undergoing balancing or when no FTRP balancing that has stopped due to an error exists.
- This function cannot be used when the specified FTRP balancing is already complete.

Note

If FTRP balancing has stopped, the following conditions apply.

- All of the balancing sessions that are currently being performed (*1) for the FTVs registered in the target FTRP are stopped. Even when balancing sessions are being stopped, FTVs that are not being balanced can be accessed normally.
- Note that completed balancing processes for the FTVs in the target FTRP (*1) cannot be stopped (the physical allocation after the balancing process cannot be changed). FTVs that are balanced can be accessed normally.

*1: When an FTRP balancing session is started, FTV balancing starts in the FTSPs. Refer to "7.2.12 Start Balancing Flexible Tier Pool" (page 248) for details.

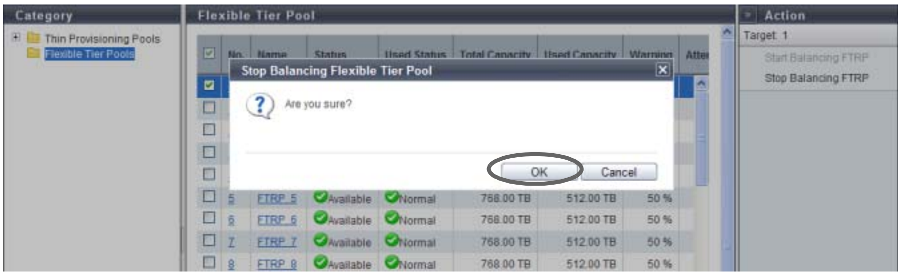
The procedure to stop balancing FTRP is as follows:

Procedure

1 Select the FTRP for which balancing is to be stopped and click [Stop Balancing FTRP] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ FTRP balancing stops.

3 Click the [Done] button to return to the [Flexible Tier Pool] screen.

End of procedure

Chapter 8
Advanced Copy Management

This chapter describes Advanced Copy management.

8.1 Advanced Copy Status

Advanced Copy status displays the status information of volumes.
Advanced Copy status screens can be displayed by clicking the following categories:

Advanced Copy status screen	Category
Advanced Copy (Basic Information)	Advanced Copy
Advanced Copy (All Local Sessions)	Local Copy
EC	EC
OPC	OPC
QuickOPC	QuickOPC
SnapOPC	SnapOPC
SnapOPC+	SnapOPC+
Monitor	Monitor
Advanced Copy (All Remote Sessions)	Remote Copy
REC	REC
Advanced Copy (ODX)	ODX
Advanced Copy (XCOPY)	XCopy
Setting (Advanced Copy)	Setting
Snap Data Pool	Snap Data Pool
Copy Path	Copy Path
REC Buffer	REC Buffer
REC Disk Buffer	REC Disk Buffer

Detailed information of the Advanced Copy functions can be displayed from the following screens:

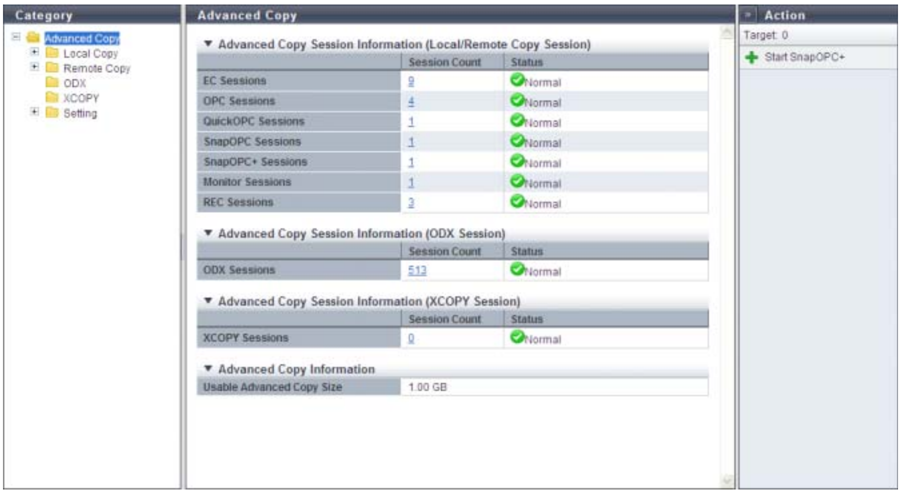
- Advanced Copy (Property)
- Advanced Copy (Extent information)
- Copy Path Detail

8.1.1 Advanced Copy (Basic Information)

This function displays the status of all the Advanced Copy sessions.

Note

- To display the Advanced Copy session information (Local/Remote Copy sessions) and the Advanced Copy information, register the Advanced Copy license.
- Registering an Advanced Copy license is not required to display the Advanced Copy Session Information (ODX Session) or the Advanced Copy Session Information (XCOPY Session).
- Click the [ ] icon to update to the latest screen.



The following items are displayed in the Main area:

● Advanced Copy Session Information (Local/Remote Copy Sessions)

- Session Count
  The number of Advanced Copy sessions that are currently being performed for each type (EC, OPC, QuickOPC, SnapOPC, SnapOPC+, Monitor, and REC) is displayed.
  The "Session Count" is a total of copy sessions in all the statuses including "Reserved". Click the [Session Count] link to display the list of sessions for each type.
  - ETERNUS DX80 S2: 0 - 1024
  - ETERNUS DX90 S2: 0 - 2048
  - ETERNUS DX410 S2/DX440 S2: 0 - 8192
  - ETERNUS DX8100 S2: 0 - 8192
  - ETERNUS DX8700 S2: 0 - 32768
- Status
  The status for each Advanced Copy session is displayed.
  - Normal
    All the copy sessions are in normal status.
  - Error
    At least one copy session is not in normal status.

Advanced Copy Session Information (ODX Session)

- Session Count
  The number of ODX sessions (0 - 4096) that are currently being performed is displayed.
  The "Session Count" is a total of copy sessions in all the statuses including "Reserved". Click the [Session Count] link to display the list of sessions.
- Status
  The status for each Advanced Copy session is displayed.
  - Normal
    All the copy sessions are in normal status.
  - Error
    At least one copy session is not in normal status.

Advanced Copy Session Information (XCOPY Session)

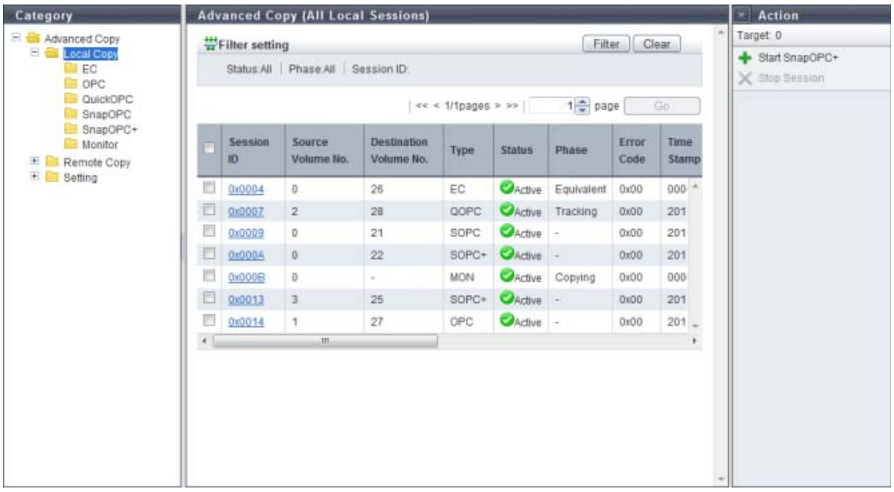
- Session Count
  The number of XCopy (Extended Copy) sessions (0 - 4096) (*1) that are currently being performed is displayed.
  The "Session Count" is a total of copy sessions in all the statuses including "Reserved". Click the [Session Count] link to display the list of sessions.
  *1: An XCOPY (Extended Copy) session is created when the Full Copy function of VMware vStorage APIs for Array Integration (VAAI) is used.
- Status
  The status for each Advanced Copy session is displayed.
  - Normal
    All the copy sessions are in normal status.
  - Error
    At least one copy session is not in normal status.

Advanced Copy Information

- Usable Advanced Copy Size
  The Advanced Copy capacity that can be added to the session is displayed.

8.1.2 Advanced Copy (All Local Sessions)

This function displays status for local copy sessions.
The following session types are available: Equivalent Copy (EC), One Point Copy (OPC), QuickOPC, SnapOPC, SnapOPC+, and Monitor.



The following items are displayed in the Main area:

- Session ID
  The session ID is displayed.
  Click this item to display the screen shown in "8.1.7 Advanced Copy (Property)" (page 277) or "8.1.8 Advanced Copy (Extent information)" (page 283).

- Source Volume No.
  The copy source volume number is displayed.
  If the status is " Reserved", a "-" (hyphen) is displayed.

- Destination Volume No.
  The copy destination volume number is displayed.
  If the "Status" is " Reserved" or the "Type" is "MON", a "-" (hyphen) is displayed.

- Type
  The copy session type is displayed using an abbreviation.
  - For Equivalent Copy: EC
  - For One Point Copy: OPC
  - For QuickOPC: QOPC
  - For SnapOPC: SOPC
  - For SnapOPC+: SOPC+
  - For Monitor: MON

- Status
  The copy session status is displayed.
  - Active
    Operating normally
  - Reserve
    Session ID reserved
  - Suspend
    Suspended by an instruction from the host
  - Error Suspend
    Copy canceled due to an error
  - Unknown
    A status other than the ones listed above
- Phase
  The copy session phase is displayed. If the status is " Reserved", a "-" (hyphen) is displayed.
  - Copying
    For OPC, EC, SnapOPC, and SnapOPC+: Copying
    For QuickOPC: Copying the updated areas after recording of updated areas is stopped
    For Monitor: Recording the updated areas
  - Equivalent
    Maintaining equivalent status of the copy source and copy destination that are duplicated after copy is complete
  - Tracking
    Recording only the updated area after copy is complete
  - Tracking & Copy
    Recording the area updated during copy processing and after copy starts
  - Readying
    Readying to start multiple copy using the Concurrent OPC.
- Error Code
  The error code is displayed when an error occurs. If the status is " Reserved", a "-" (hyphen) is displayed.
  Refer to "Appendix K Error Code" (page 1064) for details.
- Time Stamp
  The time when backup is complete and the time when an error occurred are displayed. If the status is " Reserved", a "-" (hyphen) is displayed.
  The time stamp is updated in the following conditions:
  - OPC, QuickOPC, SnapOPC, and SnapOPC+
    The time stamp is updated when copy starts and when an error occurs.
    The following information is displayed:
    - When "Status" is " Active", the backup time when the copy started is displayed.
    - When "Status" is " Error Suspend", the time when the error occurred is displayed.
  - QuickOPC
    The time stamp is updated when copy starts, restarts, and when an error occurs.
    The following information is displayed:
    - When "Status" is " Active", the backup time when the copy started is displayed.
    - When "Status" is " Error Suspend", the time when the error occurred is displayed.

- EC
  The time stamp is updated at Suspend and when an error occurs.
  The following information is displayed:
  - When "Status" is " Active" and the copy session is not suspended yet, "0" is displayed for all of the display items. When suspend is requested and "Status" is " Active", the backup time of the previous suspend that was requested is displayed.
  - When "Status" is " Suspend", the backup time when the copy was suspended is displayed.
  - When "Status" is " Error Suspend", the time when an error occurred is displayed.
- Monitor
  When "Status" is " Active", "0" is displayed for all of the display items.

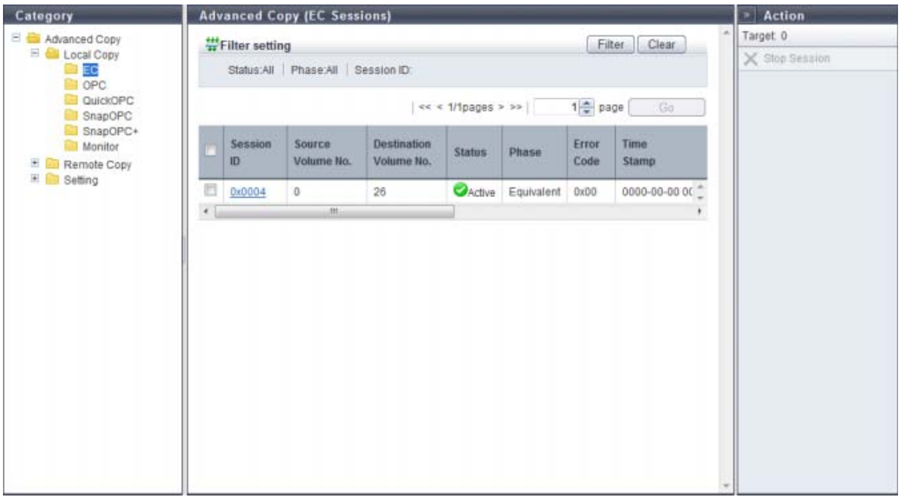
- Elapsed Time
  The elapsed time after a copy session has started is displayed. If the status is " Reserved", a "-" (hyphen) is displayed.
- Copied Data Size
  The size of copy that has been completed is displayed. If the status is " Reserved", a "-" (hyphen) is displayed.
- Total Data Size
  The total copy size is displayed. If the status is " Reserved", a "-" (hyphen) is displayed.
- Resolution
  The copy session resolution is displayed. If the status is " Reserved", a "-" (hyphen) is displayed.
- Requestor
  The information of the client that started the copy session is displayed. If the status is " Reserved", a "-" (hyphen) is displayed.
  - SCSI
    Copy session requested by the copy management software (via SCSI).
  - LAN
    Copy session requested by the copy management software (via LAN).
  - GUI
    Copy session requested by GUI.
  - CLI
    Copy session requested by CLI.
  - SMI-S
    Copy session requested by SMI-S.
- License
  The registration status of the Advanced Copy license when the copy session is started is displayed.
  - Regular
    The copy session is started with a paid license or a free license (only for the ETERNUS DX80 S2/DX90 S2).
  - Trial
    The copy session is started with a trial license. Copy sessions that use a trial license are deleted automatically after the expiration of the trial license.

Filter Setting

Filter	Description
Status	Select the copy session status that is to be displayed.
Phase	Select the copy session phase that is to be displayed.
Session ID	Input the session ID of the copy session that is to be displayed. When not using the session ID for filtering, leave this item blank.

8.1.2.1 EC

This function displays detailed information for EC sessions.

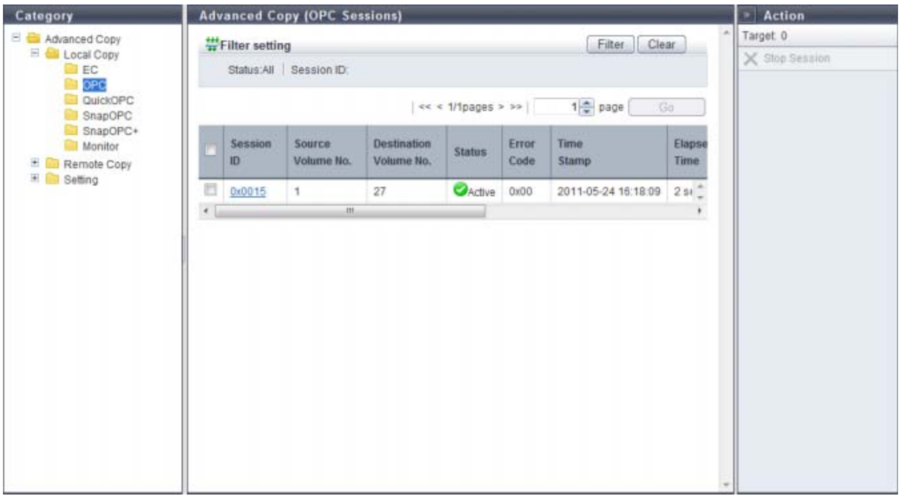


Note

Refer to "8.1.2 Advanced Copy (All Local Sessions)" (page 254) for display items.

8.1.2.2 OPC

This function displays detailed information for OPC sessions.

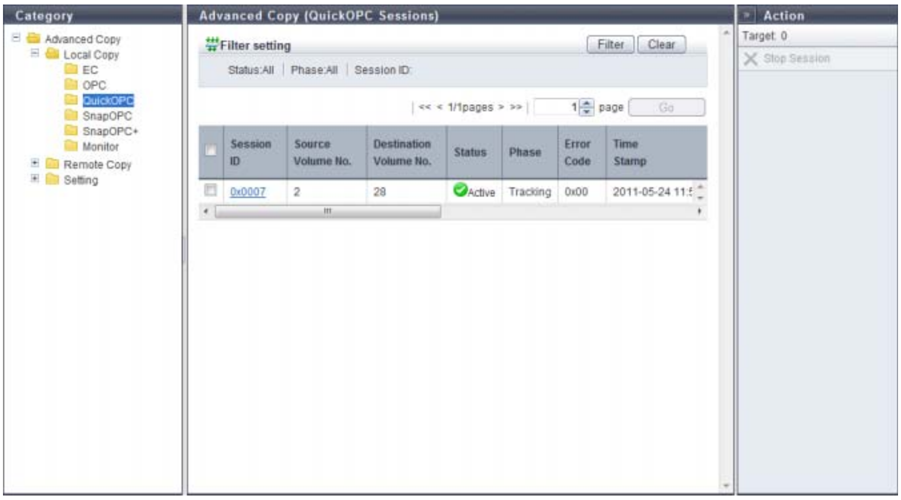


Note

Refer to "8.1.2 Advanced Copy (All Local Sessions)" (page 254) for display items.

8.1.2.3 QuickOPC

This function displays detailed information for Quick OPC sessions.



The following items are displayed in the Main area:

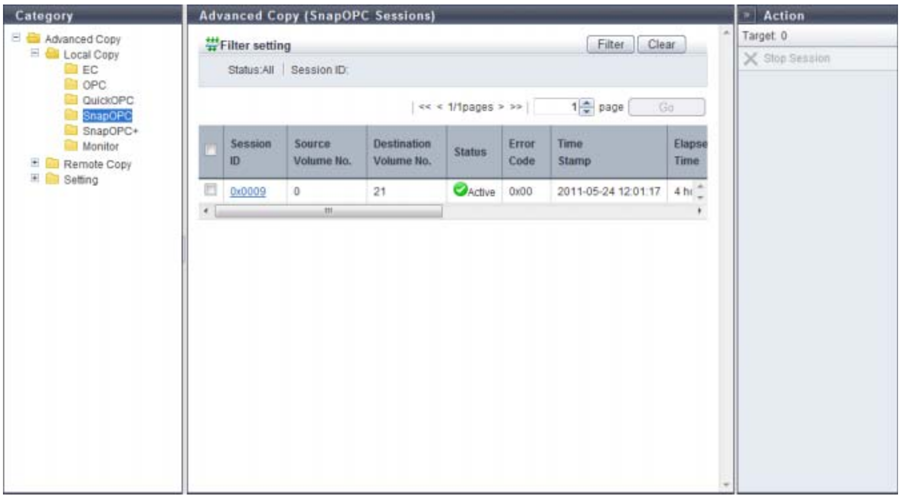
- Modified Data Size
  The differential data size when QuickOPC is executed is displayed.
  The modified data size is updated in the "Tracking & Copy" and "Tracking" phases. When recopy starts, the modified data size is once changed to "0" and then the differential data size from the time when recopy started is displayed. When tracking stops, the modified data size is changed to "0". If the status is " Reserved", a "-" (hyphen) is displayed.

Note

Refer to "8.1.2 Advanced Copy (All Local Sessions)" (page 254) for the display items that are not described in this section.

8.1.2.4 SnapOPC

This function displays detailed information for SnapOPC sessions.



The following items are displayed in the Main area:

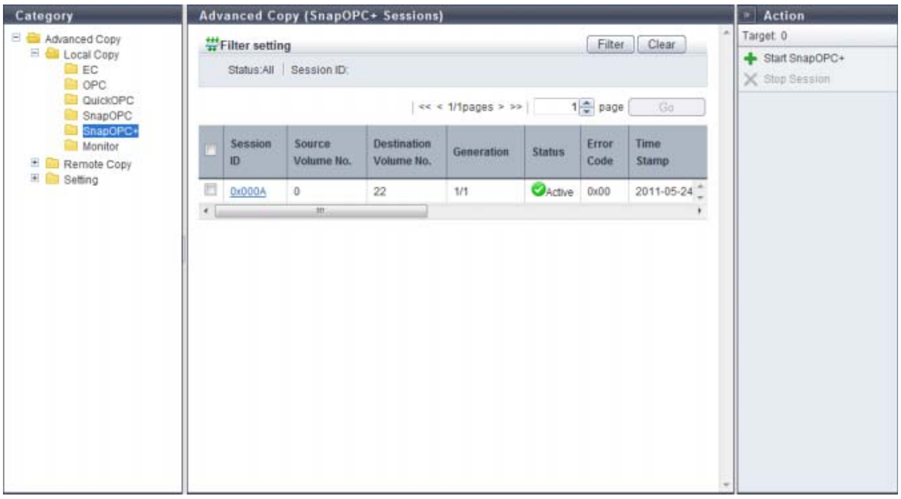
- SDP No.
  The Snap Data Pool number, which is used when the copy destination SDV capacity is insufficient, is displayed. If the status is " Reserved", a "-" (hyphen) is displayed.
- SDP Used Capacity
  The used capacity of Snap Data Pool is displayed. If the status is " Reserved", a "-" (hyphen) is displayed.

Note

Refer to "8.1.2 Advanced Copy (All Local Sessions)" (page 254) for the display items that are not described in this section.

8.1.2.5 SnapOPC+

This function displays detailed information for SnapOPC+ sessions.



The following items are displayed in the Main area:

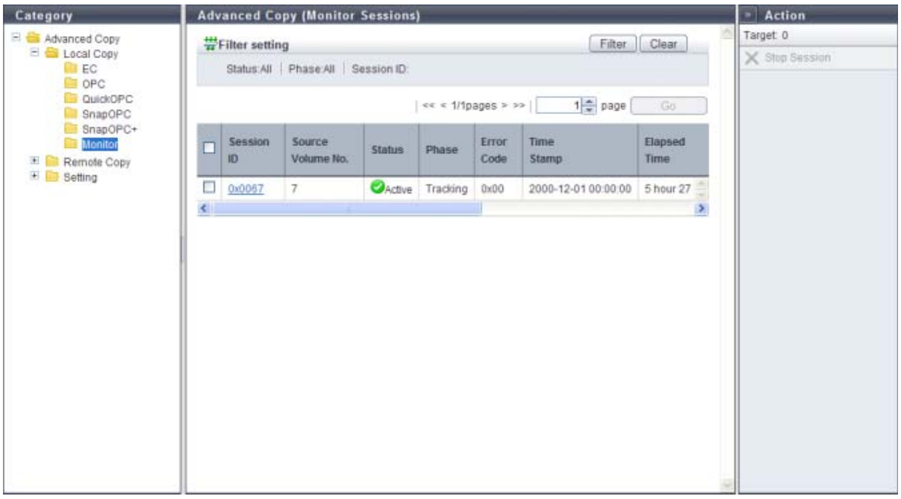
- Generation
  The generation and total number of generations of the copy session are displayed.
- SDP No.
  The Snap Data Pool number, which is used when the copy destination SDV capacity is insufficient, is displayed. If the status is " Reserved", a "-" (hyphen) is displayed.
- SDP Used Capacity
  The used capacity of Snap Data Pool is displayed. If the status is " Reserved", a "-" (hyphen) is displayed.

Note

Refer to "8.1.2 Advanced Copy (All Local Sessions)" (page 254) for the display items that are not described in this section.

8.1.2.6 Monitor

This function displays detailed information for Monitor sessions.

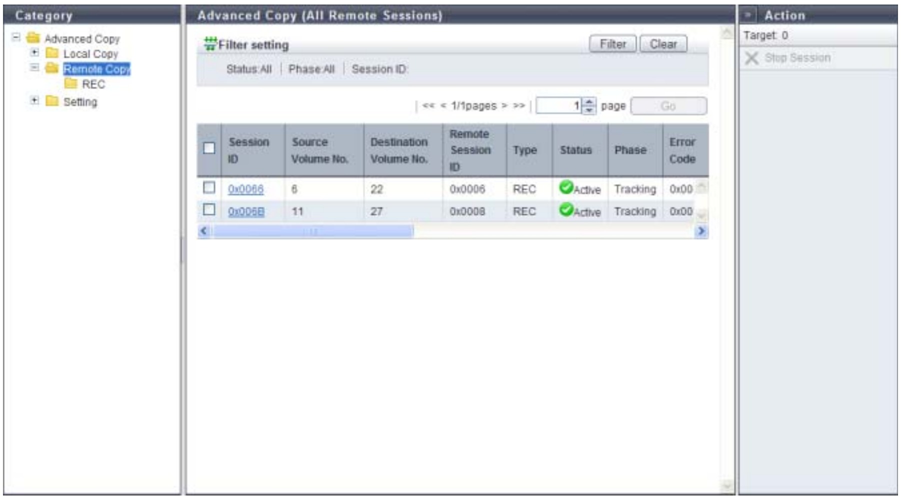


Note

Refer to "8.1.2 Advanced Copy (All Local Sessions)" (page 254) for display items.

8.1.3 Advanced Copy (All Remote Sessions)

This function displays the status for remote copy sessions.



The following items are displayed in the Main area:

- Session ID
  The session ID is displayed.
  Click this item to display the screen shown in "8.1.7 Advanced Copy (Property)" (page 277) or "8.1.8 Advanced Copy (Extent information)" (page 283).

- Source Volume No.

  The copy source volume number is displayed. If the status is " Reserved", a "-" (hyphen) is displayed.

- Destination Volume No.

  The copy destination volume number is displayed. If the status is " Reserved", a "-" (hyphen) is displayed.

- Remote Session ID
  The session ID for the remote device is displayed.

- Type
  The copy session type is displayed using an abbreviation (REC).

- Status
  The copy session status is displayed.
  - Active
    Operating normally
  - Reserve
    Session ID reserved
  - Suspend
    Suspended by an instruction from the host
  - Halt
    Remote copy disabled due to an error
  - Error Suspend
    Copy canceled due to an error
  - Unknown
    A status other than the ones listed above

- Phase

  The copy session phase is displayed. If the status is " Reserved", a "-" (hyphen) is displayed.
  - Copying
    Copying
  - Equivalent
    Maintaining equivalent status of the copy source and copy destination that are duplicated after copy is complete

- Error Code

  The error code is displayed when an error occurs. If the status is " Reserved", a "-" (hyphen) is displayed.
  Refer to "Appendix K Error Code" (page 1064) for details.

- Direction

  The copy direction of the applicable session is displayed. If the status is " Reserved", a "-" (hyphen) is displayed.
  - From Local/To Remote
    Session from the local device (copy source) to the remote device (copy destination)
  - From Remote/To Local
    Session from the remote device (copy source) to the local device (copy destination)

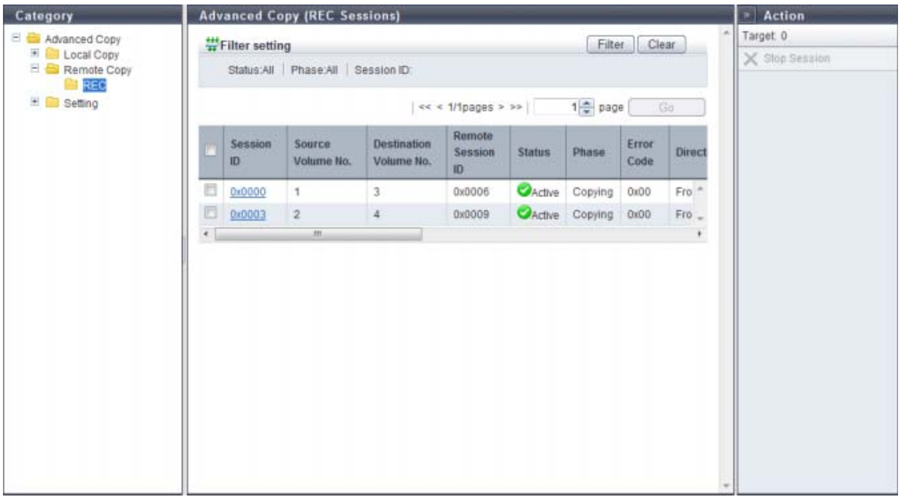
- Time Stamp
  The time when backup has been completed, and the time when an error occurred, are displayed.
  The time stamp is updated when the process is suspended, when an error occurs, and when the status is changed.
  The following information is displayed for "Time Stamp".
  - When "Status" is " Reserved", a "-" (hyphen) is displayed.
  - When "Status" is " Active" and the copy session is not suspended yet, "0" is displayed for all of the display items. When suspend is requested and "Status" is " Active", the backup time of the previous suspend that was requested is displayed.
  - When "Status" is " Suspend", the backup time when the copy was suspended is displayed.
  - When "Status" is " Error Suspend", the time when an error occurred is displayed.
  - When "Status" is " Halt", the time when an error occurred is displayed.
    When the status is changed from " Halt" to " Active" or when the copy session is forcibly suspended, the time stamp information is cleared and "0" is displayed for all of the display items.
- Elapsed Time
  The elapsed time after a copy session starts is displayed. If the status is " Reserved", a "-" (hyphen) is displayed.
- Copied Data Size
  The size of copy that has been completed is displayed. If the status is " Reserved", a "-" (hyphen) is displayed.
- Total Data Size
  The total copy size is displayed. If the status is " Reserved", a "-" (hyphen) is displayed.
- Resolution
  The copy session resolution is displayed. If the status is " Reserved", a "-" (hyphen) is displayed.
- Requestor
  The information of the client that started the copy session is displayed. If the status is " Reserved", a "-" (hyphen) is displayed.
  - SCSI
    Copy session requested by the copy management software (via SCSI).
  - LAN
    Copy session requested by the copy management software (via LAN).
  - SMI-S
    Copy session requested by SMI-S.
- License
  The registration status of the Advanced Copy license when the copy session is started is displayed.
  If the license information for the connection target storage system cannot be obtained due to an REC path error, "Unknown" is displayed.
  - Regular
    The copy session is started with a paid license.
  - Trial
    The copy session is started with a trial license. Copy sessions that use a trial license are deleted automatically after the expiration of the trial license.

Filter Setting

Filter	Description
Status	Select the copy session status that is to be displayed.
Phase	Select the copy session phase that is to be displayed.
Session ID	Input the session ID of the copy session that is to be displayed. When not using the session ID for filtering, leave this item blank.

8.1.3.1 REC

This function displays detailed information for REC sessions.

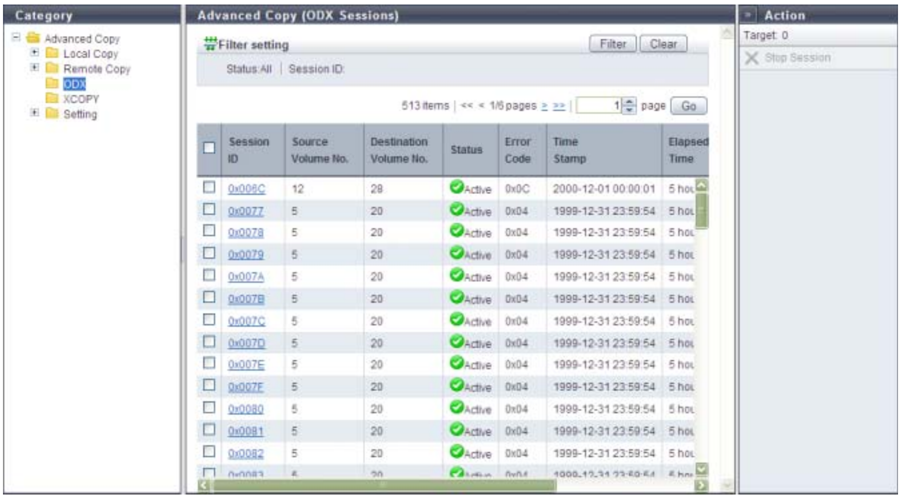


Note

Refer to "8.1.3 Advanced Copy (All Remote Sessions)" (page 261) for display items.

8.1.4 Advanced Copy (ODX)

This function displays the status for ODX sessions.
ODX sessions are created when the ODX function is used for a server with "Windows Server 2012". The ODX function offloads the workload for copying or migrating data from the server to the ETERNUS DX Disk storage system.



The following items are displayed in the Main area:

- Session ID
  The session ID is displayed.
  Click this item to display the screen shown in "8.1.7 Advanced Copy (Property)" (page 277) or "8.1.8 Advanced Copy (Extent information)" (page 283).

- Source Volume No.
  The copy source volume number is displayed. If the status is " Reserved", a "-" (hyphen) is displayed.

- Destination Volume No.
  The copy destination volume number is displayed. If the status is " Reserved", a "-" (hyphen) is displayed.

- Status
  The copy session status is displayed.
  - Active
    Operating normally
  - Reserve
    Session ID reserved
  - Error Suspend
    Copy canceled due to an error
  - Unknown
    A status other than the ones listed above

- Error Code
  The error code is displayed when an error occurs. If the status is " Reserved", a "-" (hyphen) is displayed.
  Refer to "Appendix K Error Code" (page 1064) for details.

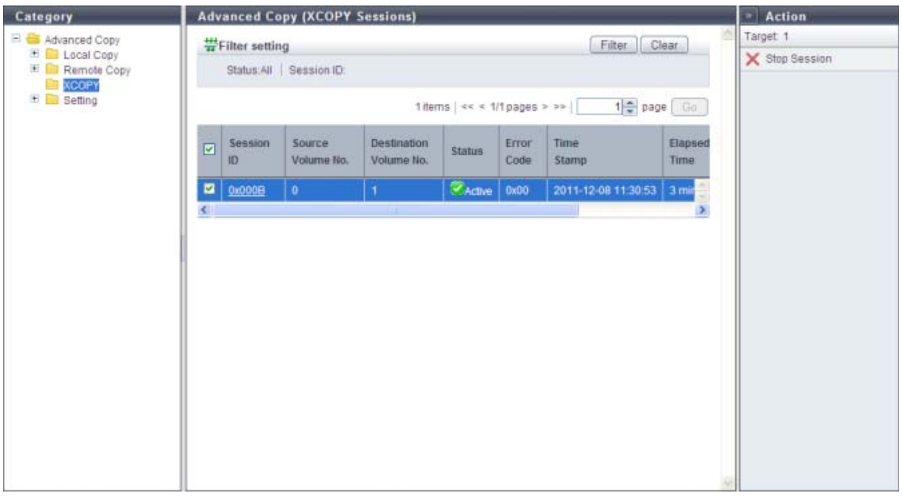
- Time Stamp
  The time when backup is complete and the time when an error occurred are displayed.
  The time stamp is updated when starting a copy session or an error occurs.
  The following information are displayed for this item:
  - If the status is " Reserved", a "-" (hyphen) is displayed.
  - If the status is " Active", the previous backup time is displayed.
  - If the status is " Error Suspend", the time when an error occurred is displayed.
- Elapsed Time
  The elapsed time after a session starts is displayed. If the status is " Reserved", a "-" (hyphen) is displayed.
- Copied Data Size
  The size of copy that has been completed is displayed. If the status is " Reserved", a "-" (hyphen) is displayed.
- Total Data Size
  The total copy size is displayed. If the status is " Reserved", a "-" (hyphen) is displayed.

Filter Setting

Filter	Description
Status	Select the copy session status that is to be displayed.
Session ID	Input the session ID of the copy session that is to be displayed. When not using the session ID for filtering, leave this item blank.

8.1.5 Advanced Copy (XCOPY)

This function displays the status for XCOPY sessions.
An XCOPY (Extended Copy) session is created when the Full Copy function of VMware vStorage APIs for Array Integration (VAAI) is used.



The following items are displayed in the Main area:

- Session ID
  The session ID is displayed.
  Click this item to display the screen shown in "8.1.7 Advanced Copy (Property)" (page 277) or "8.1.8 Advanced Copy (Extent information)" (page 283).

- Source Volume No.

  The copy source volume number is displayed. If the status is " Reserved", a "-" (hyphen) is displayed.

- Destination Volume No.

  The copy destination volume number is displayed. If the status is " Reserved", a "-" (hyphen) is displayed.

- Status
  The copy session status is displayed.
  - Active
    Operating normally
  - Reserve
    Session ID reserved
  - Error Suspend
    Copy canceled due to an error
  - Unknown
    A status other than the ones listed above

- Error Code

  The error code is displayed when an error occurs. If the status is " Reserved", a "-" (hyphen) is displayed.
  Refer to "Appendix K Error Code" (page 1064) for details.

- Time Stamp
  The time when backup has been completed, and the time when an error occurred, are displayed.
  The time stamp is updated when starting a copy session or an error occurs.
  The following information is displayed:
  - If the status is " Reserved", a "-" (hyphen) is displayed.
  - If the status is " Active", the previous backup time is displayed.
  - If the status is " Error Suspend", the time when the error occurred is displayed.

- Elapsed Time

  The elapsed time after a session starts is displayed. If the status is " Reserved", a "-" (hyphen) is displayed.

- Copied Data Size

  The size of copy that has been completed is displayed. If the status is " Reserved", a "-" (hyphen) is displayed.

- Total Data Size

  The total copy size is displayed. If the status is " Reserved", a "-" (hyphen) is displayed.

Filter Setting

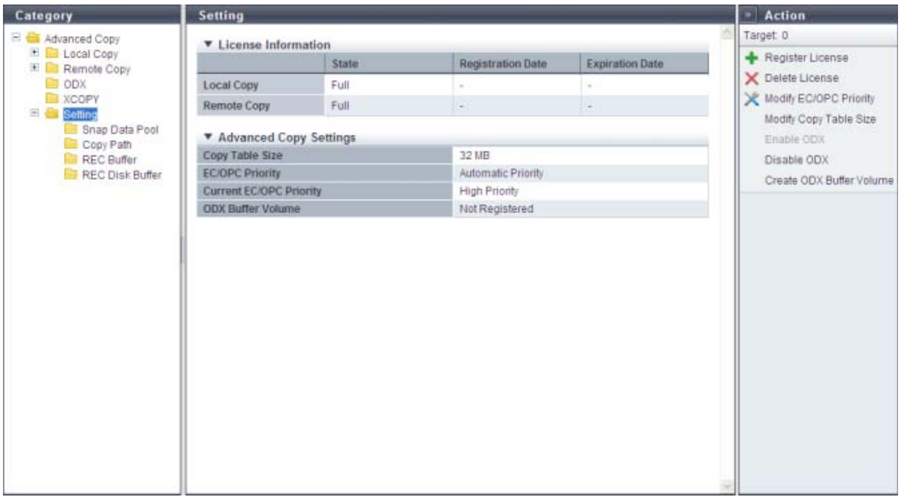
Filter	Description
Status	Select the copy session status that is to be displayed.
Session ID	Input the session ID of the copy session that is to be displayed. When not using the session ID for filtering, leave this item blank.

8.1.6 Setting (Advanced Copy)

This function displays the current Advanced Copy license registration status and the Advanced Copy setting status.

Note

- When the trial license is registered, the registration date and the expiration date is displayed.
- The registration of an Advanced Copy license or setting of a copy table size is not required when using the Full Copy function of VMware vStorage APIs for Array Integration (VAAI) with controller firmware version V10L20 or later.



The following items are displayed in the Main area:

License Information

- State
  Registration status of the Advanced Copy license is displayed.
  - Not Registered
    No license is registered.
  - Free/VAAI
    A free license and a VAAI-use license are registered.
    Up to eight local copy sessions can be created. In addition, the Full Copy function of VMware VAAI can be used. "Free License/VAAI" is displayed only for the ETERNUS DX80 S2/DX90 S2.

  - VAAI
    VAAI-use license is registered.
    The Full Copy function of VMware VAAI can be used. "VAAI" is displayed only for the ETERNUS DX410 S2/ ETERNUS DX440 S2 or the ETERNUS DX8100 S2/DX8700 S2.
  - Trial
    A trial license is registered. All of the Advanced Copy functions can be used for a limited time.
  - Full
    A paid license is registered. All of the advanced copy functions can be used.

- Registration Date
  The date when the trial license was registered is displayed. A "-" (hyphen) is displayed in the following conditions:
  - Trial license has never been registered.
  - A paid license, a free license, or VAAI is registered.

- Expiration Date
  The expiration date for the trial license is displayed. A "-" (hyphen) is displayed in the following conditions:
  - Trial license has never been registered.
  - A paid license, a free license, or VAAI is registered.

Advanced Copy Settings

- Copy Table Size
  A copy table size is displayed.

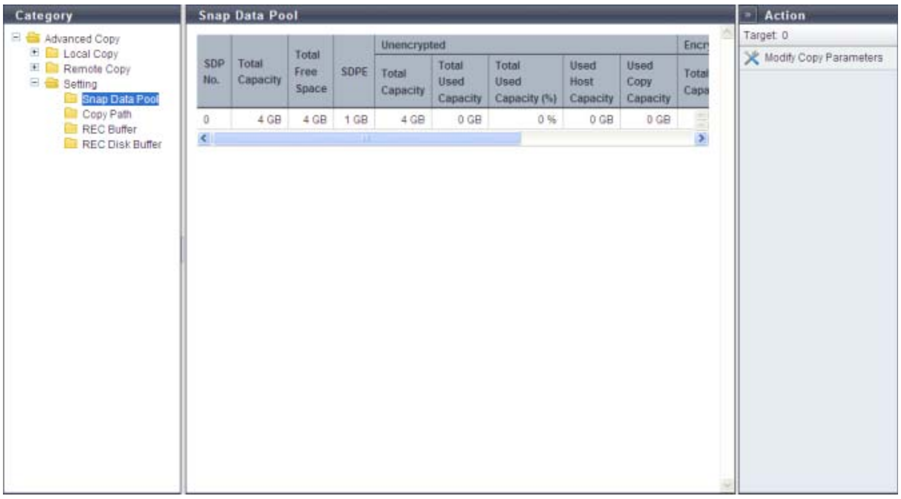
- EC/OPC Priority
  The EC/OPC priority is displayed.
  - Automatic Priority
    This mode changes the EC/OPC priority automatically in response to the operating load status.
  - High Priority
    This mode operates by making maximum use of internal resources.
  - Middle Priority
    This mode operates slightly slower than the High Priority mode.
  - Low Priority
    This mode reduces the effect on host access.
  - Very Low Priority
    This mode operates slower than the Low Priority mode.

- Current EC/OPC Priority
  The current EC/OPC priority is displayed.
  - High Priority
  - Middle Priority
  - Low Priority
  - Very Low Priority

- ODX Buffer Volume
  The registration status of the ODX Buffer volume is displayed.
  - Registered
  - Not Registered

8.1.6.1 Snap Data Pool

This function displays the SDP status.
SDP is the area used when in case executing SnapOPC and SnapOPC+ increases the amount of copy data and exceeds the SDV capacity.
SDP becomes available when creating an SDPV. Created SDPV is automatically added to the SDP.



The following items are displayed in the Main area:

- SDP No.
  The SDP number (fixed as "0") is displayed.
- Total Capacity
  The total capacity of the SDP is displayed.
- Total Free Space
  The total free space of the SDP is displayed.
- SDPE
  Snap Data Pool Element (SDPE), the allocation unit for SDV, is displayed. Displayed with 1GB, 2GB, or 4GB.
- Unencrypted
  - Total Capacity
    The total capacity of unencrypted SDP is displayed.
  - Total Used Capacity
    The total used capacity of unencrypted SDP is displayed.
  - Total Used Capacity (%)
    The usage rate of unencrypted SDP is displayed.
  - Used Host Capacity
    The total capacity of the SDPE that is allocated for an unencrypted SDV where a capacity shortage caused by data writing from the host has occurred is displayed.
  - Used Copy Capacity
    The total capacity of the SDPE that is allocated for an unencrypted SDV where a capacity shortage caused by SnapOPC or SnapOPC+ has occurred is displayed.

- Encrypted
  - Total Capacity
    The total capacity of encrypted SDP is displayed.
  - Total Used Capacity
    The total used capacity of encrypted SDP is displayed.
  - Total Used Capacity (%)
    The usage rate of encrypted SDP is displayed.
  - Used Host Capacity
    The total capacity of the SDPE that is allocated for an encrypted SDV where a capacity shortage caused by data writing from the host has occurred is displayed.
  - Used Copy Capacity
    The total capacity of the SDPE that is allocated for an encrypted SDV where a capacity shortage caused by SnapOPC or SnapOPC+ has occurred is displayed.

8.1.6.2 Copy Path

This function displays the Remote Equivalent Copy (REC) path status between the local and remote devices. It shows whether the copy path created with the function in "8.2.12 Set Copy Path" (page 318) is operating properly.
Select the target remote device. (Up to 16 storage systems can be registered.) The following items are displayed.

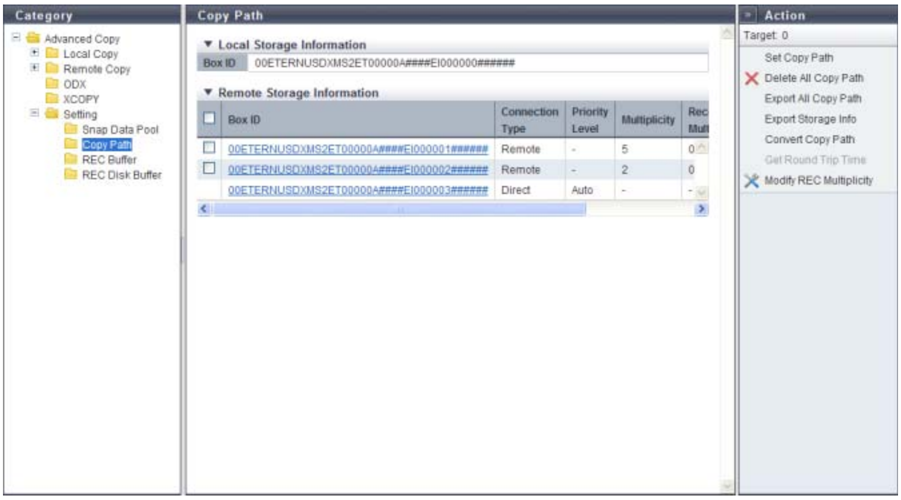
- Storage System
- Advanced Copy Path Status

Caution

This function is used to check the copy path status by actually sending a command to the copy path between the storage systems. After following the procedure in "8.2.12 Set Copy Path" (page 318) to set a copy path, make sure to check the copy path status with the Copy Path function.

Note

- The "Priority Level" and the "Multiplicity" settings can be specified for each remote Box ID. Refer to "8.2.18 Modify REC Multiplicity" (page 351) for details.
- To change the "Link Speed" setting, create a copy path with a new link speed by using the [Set Copy Path] function, and apply the created copy path to the related storage systems. Refer to "8.2.12 Set Copy Path" (page 318) for details.



The following items are displayed in the Main area:

Local Device Information

- Box ID
  The Box ID for the local device is displayed.
  "Box ID" is an identifier used to identify individual storage systems. This ID is a unique name in the user system and consists of 40-digit code.
  The initial Box ID is a device ID consisting of device information (such as series name, model name, and serial number).

Remote Device Information

- Box ID
  This is the Box ID of the remote device that has a path to the local device. Click this item to display the [Copy Path] screen. Refer to "8.1.9 Copy Path Detail" (page 284) for details.
- Connection Type
  The type of connection to the remote device that has a path to the local device is displayed.
  - Direct
  - Remote
- Priority Level
  When the local device and the remote device are connected by direct connection, the priority level is displayed. When the "Connection Type" is "Remote", a "-" (hyphen) is displayed.
  - Automatic
    REC is performed using the priority level (Automatic Priority/High Priority/Middle Priority/Low Priority/Very Low Priority) that is specified using the procedure in "8.2.6 Modify EC/OPC Priority" (page 298).
  - 1 - 8
    REC is performed with the displayed priority level. "1" corresponds to "Very Low Priority", and "8" corresponds to "High Priority" that is specified using the procedure in "8.2.6 Modify EC/OPC Priority" (page 298).

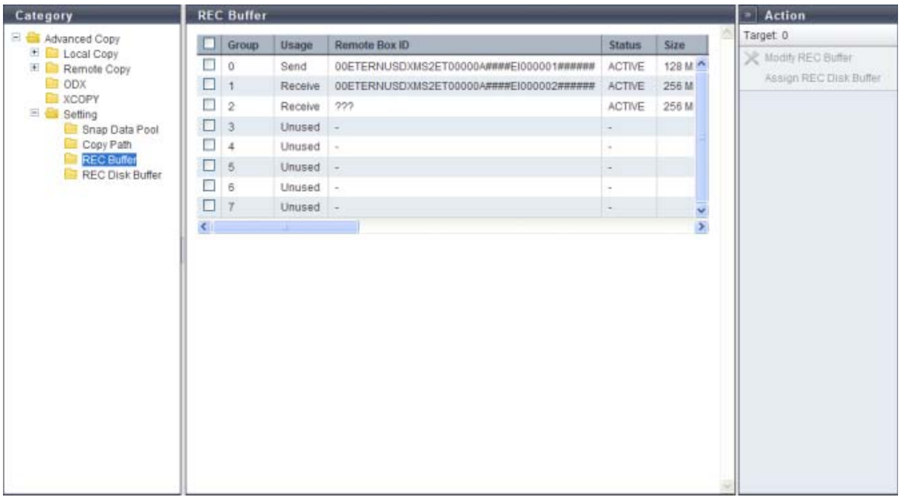
- Multiplicity
  When the local device and the remote device are connected by remote connection, the multiplicity is displayed. If the "Connection Type" is "Direct", a "-" (hyphen) is displayed.
  - Automatic
    REC is performed with the recommended multiplicity that is calculated using the procedure in "8.2.17 Measure Round Trip Time" (page 349).
  - 1 - 1024
    REC is performed with the multiplicity that is manually specified using the procedure in "8.2.18 Modify REC Multiplicity" (page 351).
- Recommended Multiplicity
  When the local device and the remote device are connected by remote connection, the recommended multiplicity is displayed. If the "Connection Type" is "Direct", a "-" (hyphen) is displayed.
  - 0
    The factory default setting.
  - 1 - 1024
    The recommended multiplicity that is calculated using the procedure in "8.2.17 Measure Round Trip Time" (page 349).
  - ***
    The recommended multiplicity is not measured using the procedure in "8.2.17 Measure Round Trip Time" (page 349).
- Link Speed
  When the local device and the remote device are connected by remote connection, the link speed is displayed between 1 Mbit/s - 65535 Mbit/s. If the "Connection Type" is "Direct", a "-" (hyphen) is displayed.

8.1.6.3 REC Buffer

This function displays the REC Buffer status when performing REC in "REC asynchronous consistency mode". The "Consistency mode" secures the order of data transfer to the remote device for all of the specified REC sessions. This mode requires constant securement of the dedicated REC Buffer in the cache memory. Copying via REC Buffer stores multiple REC session I/Os in the REC Buffer for a certain period of time, and copies in blocks.

Caution

Check if the REC Buffer capacity of the copy source and that of the copy destination are the same size.
If the capacities are not the same, configure the settings, using the procedure in "8.2.19 Modify REC Buffer" (page 354) function, so that the REC Buffer capacity of the copy source and that of the copy destination become the same size.



The following items are displayed in the Main area:

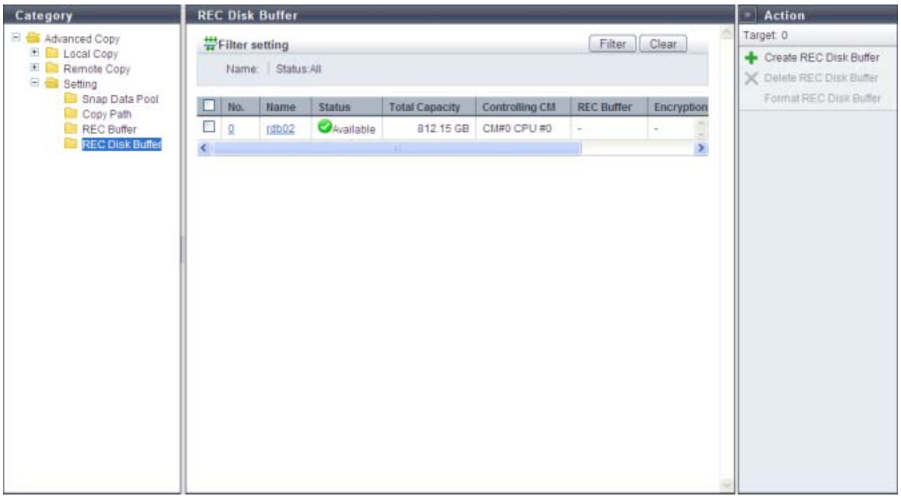
- Group
  The management group number of the REC Buffer is displayed.
  - ETERNUS DX90 S2: 0 - 3
  - ETERNUS DX410 S2/DX440 S2: 0 - 7
  - ETERNUS DX8100 S2/DX8700 S2: 0 - 7
- Usage
  The REC Buffer usage is displayed.
  - Unused
  - Send
  - Receive
- Remote Box ID
  The Box ID for the remote device is displayed.
  If the copy path information is deleted, "???" is displayed. When the REC Buffer usage is "Unused", a "-" (hyphen) is displayed.
- Status
  The REC Buffer status is displayed.
  - ACTIVE
    REC Buffer is available.
  - INACTIVE
    REC Buffer is not available.
- Size
  The REC Buffer size is displayed. When the REC Buffer usage is "Unused", a "-" (hyphen) is displayed.
  - ETERNUS DX90 S2: 128MB, 256MB, 512MB
  - ETERNUS DX410 S2/DX440 S2: 128MB, 256MB, 512MB, 1024MB, 2048MB
  - ETERNUS DX8100 S2/DX8700 S2: 128MB, 256MB, 512MB, 1024MB, 2048MB
- Forwarding Interval
  The data transfer interval is displayed. When the REC Buffer usage is "Unused", a "-" (hyphen) is displayed.

- Monitoring Time
  The monitoring time, before transition to the "Halt" status for a copy session when an REC Buffer shortage occurs, is displayed. When the monitoring time" is "0 min.", the ETERNUS DX Disk storage system is not being monitored. When the REC Buffer usage is "Unused", a "-" (hyphen) is displayed.
- HALT Wait Timer
  The maximum non-responding time is displayed. During the non-response time, the host I/O response is stopped to give priority to performing REC Buffer transfers in a high-load state. When the REC Buffer usage is "Unused", a "-" (hyphen) is displayed.
- I/O Priority Mode
  Whether the "I/O Priority Mode" is enabled or disabled is displayed. A "-" (hyphen) is displayed when the usage is "Unused".
  "I/O Priority Mode" reduces the effect on host I/O when an initial copy for starting, restarting, or recovering the copy function is performed.
  This item is available when logged in using a user account with the "Advanced Copy Management" policy.
- Immediate HALT Mode
  Whether the "Immediate HALT Mode" is enabled or disabled is displayed. A "-" (hyphen) is displayed when the usage is "Unused".
  "Immediate HALT Mode" reduces the effect on host I/O because the REC Buffer is insufficient when "HALT Wait Timer" is set to "0 sec.".
  This item is available when logged in using a user account with the "Advanced Copy Management" policy.
- REC Disk Buffer Status
  When the REC Buffer usage is "Send", the status of the REC Disk Buffers that are assigned to the REC Buffer are displayed. When the REC Buffer usage is "Receive" or "Unused", a "-" (hyphen) is displayed.
  - Active
    All of the REC Disk Buffers in the REC Buffer are available.
  - Rebuilding
    Rebuild/copyback is being performed in some of the REC Disk Buffers.
  - Formatting
    Formatting is being performed in some of the REC Disk Buffers.
  - Not Supported
    The copy destination storage system for REC does not support the REC Disk Buffers.
  - Not Mirrored
    Some of the REC Disk Buffers have lost redundancy due to disk failure.
  - Error
    Some of the REC Disk Buffers cannot be used (due to RAID group failure or RAID group blockage).

  If the "REC Disk Buffer Status" is "Formatting", "Not Supported", or "Error", all of the other REC Disk Buffers that belong to the same REC Buffer cannot be used.
- REC Disk Buffer Total Capacity
  When the usage is "Send", the total capacity of the REC Disk Buffer, which is assigned to the REC Buffer, is displayed. When the REC Buffer usage is "Receive" or "Unused", a "-" (hyphen) is displayed.
- Total Storage Data Size
  When the usage is "Send", the used capacity of the REC Disk Buffer, which is assigned to the REC Buffer, is displayed. When the REC Buffer usage is "Receive" or "Unused", a "-" (hyphen) is displayed.
- Free Disk Buffer Size
  When the usage is "Send", the unused capacity of the REC Disk Buffer, which is assigned to the REC Buffer, is displayed. When the REC Buffer usage is "Receive" or "Unused", a "-" (hyphen) is displayed.

8.1.6.4 REC Disk Buffer

This function displays the existing REC Disk Buffers in the ETERNUS DX Disk storage system.



The following items are displayed in the Main area:

- REC Disk Buffer List

  - No.
    The RAID group number of the REC Disk Buffer is displayed. Click this item to display the [REC Disk Buffer Detail] screen.
  - Name
    The REC Disk Buffer name is displayed. Click this item to display the [REC Disk Buffer Detail] screen.
  - Status
    The REC Disk Buffer status is displayed. Refer to "B.3 RAID Group Status" (page 975) for details.
  - Total Capacity
    The total capacity of the REC Disk Buffer is displayed.
  - Controlling CM
    The controlling CM and CPU for the REC Disk Buffer are displayed.
    - CM#x CPU#y (x: CM number, y: CPU number)
  - REC Buffer
    The management group number of the REC Buffer, to which the REC Disk Buffer is assigned, is displayed. A "-" (hyphen) is displayed for an REC Disk Buffer that is not assigned to any REC Buffers.
    - ETERNUS DX90 S2: 0 - 3
    - ETERNUS DX410 S2/DX440 S2: 0 - 7
    - ETERNUS DX8100 S2/DX8700 S2: 0 - 7

- Encryption
  The encryption status of the REC Disk Buffer is displayed.
  - CM
    An REC Disk Buffer that is encrypted by CM
  - "-" (hyphen)
    An REC Disk Buffer that is not encrypted (unencrypted volume)
  - SED
    An REC Disk Buffer that is encrypted by SED
- Processing Function
  A process that is being performed for the REC Disk Buffer is displayed. If no process is being performed, a "-" (hyphen) is displayed.
  - Recovery
    Rebuild, copyback, redundant copy, or recovery of the RAID group is being performed.
  - Formatting
    Formatting is being performed.

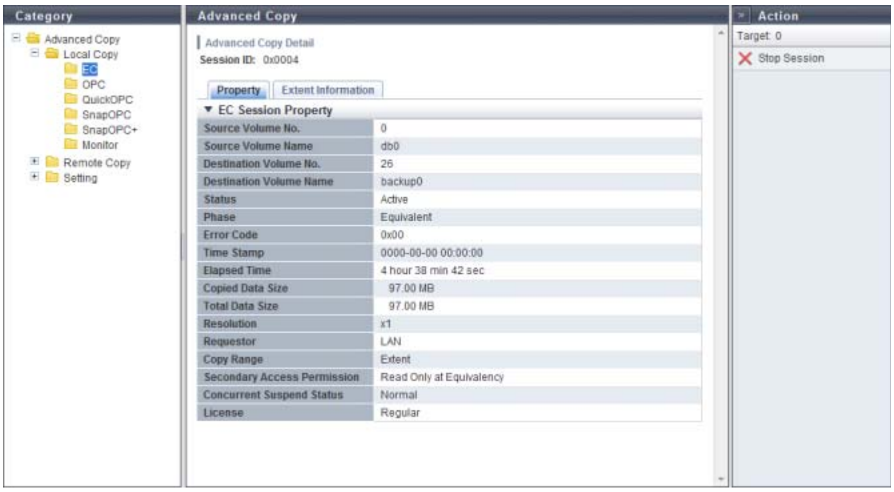
Filter Setting

Filter	Description
Name	Input the REC Disk Buffer name that is to be displayed. REC Disk Buffers matching or partially matching the input name are displayed. When not using the REC Disk Buffer name for filtering, leave this item blank.
Status	Select the REC Disk Buffer status that is to be displayed. When not using the REC Disk Buffer status for filtering, select "All" (all REC Disk buffers).

8.1.7 Advanced Copy (Property)

Detailed information (Property) about the Advanced Copy is displayed.

For Local Copy



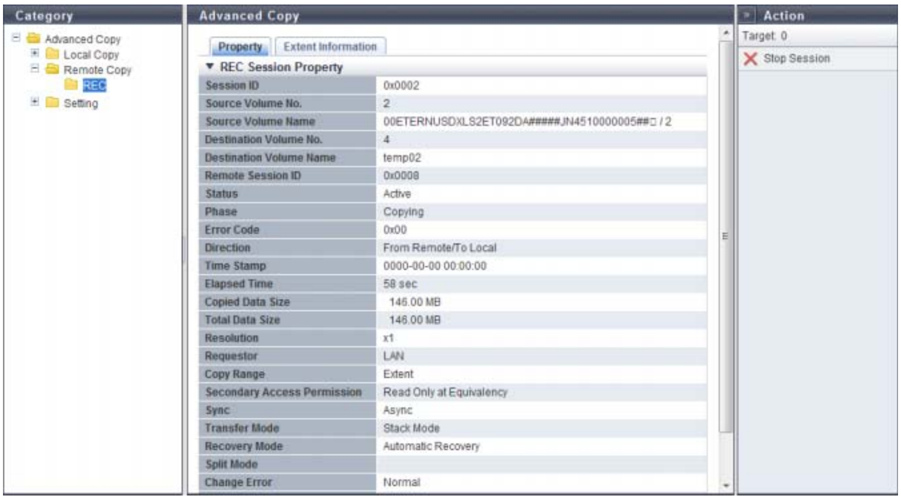
The following items are displayed in the Main area:

- Session ID
  The session ID selected in the [Local Copy] screen is displayed.
- Source Volume Name
  The copy source volume name is displayed. If the status is "Reserved", a "-" (hyphen) is displayed.
- Destination Volume Name
  The copy destination volume name is displayed. When the "Status" is "Reserved", a "-" (hyphen) is displayed. When the "Type" is "MON", a "-" (hyphen) is displayed.
- Copy Range
  The copy range of the copy session is displayed. If the status is "Reserved", a "-" (hyphen) is displayed.
  - Totally
    Whole volume
  - Extent
    Part of volume
- Secondary Access Permission
  If the status is "Active", accessibility from the host to the copy destination volume is displayed. This item is displayed in EC. If the status is "Reserved", a "-" (hyphen) is displayed.
  - Read Only at Equivalency
    When the "Phase" is "Equivalent", only read access to the copy destination volume is allowed
  - No Read/Write
    No read/write access to the copy destination volume is allowed
- Concurrent Suspend Status
  When an instruction to collectively and tentatively separate multiple pairs of a copy source volume and a copy destination volume (Concurrent Suspend request) is received in EC session, transition status to "Suspend" is displayed. This item is displayed in EC. If the status is "Reserved", a "-" (hyphen) is displayed. If the Concurrent Suspend Status cannot be obtained, "Unknown" is displayed.
  - Normal
    Transition to "Suspend" status is complete or Concurrent Suspend cannot be performed
  - Exec
    Transition to "Suspend" status in progress
  - Error
    Transition to "Suspend" status failed
  - Unknown
    A status other than the ones listed above

Note

Refer to "8.1.2 Advanced Copy (All Local Sessions)" (page 254) for the display items that are not described in this section.

For Remote Copy



The following items are displayed in the Main area:

- Session ID
  The session ID selected in the [Remote Copy] screen is displayed here.
- Source Volume Name
  The following is displayed depending on the "Direction". If the status is " Reserved", a "-" (hyphen) is displayed.
  - When the "Direction" is "From Local/To Remote"
    The copy source volume name is displayed.
  - When the "Direction" is "From Remote/To Local"
    The "Remote Box ID / Copy source volume number" is displayed.
- Destination Volume Name
  The following is displayed depending on the "Direction". If the status is " Reserved", a "-" (hyphen) is displayed.
  - When the "Direction" is "From Local/To Remote"
    The "Remote Box ID / Copy destination volume number" is displayed.
  - When the "Direction" is "From Remote/To Local"
    The copy destination volume name is displayed.
- Copy Range
  The copy range of the copy session is displayed. If the status is " Reserved", a "-" (hyphen) is displayed.
  - Totally
    Whole volume
  - Extent
    Part of volume
- Secondary Access Permission
  If the status is " Active", accessibility from the host to the copy destination volume is displayed. If the status is " Reserved", a "-" (hyphen) is displayed.
  - Read Only at Equivalency
    When the "Phase" is "Equivalent", only read access to the copy destination volume is allowed
  - No Read/Write
    No read/write access to the copy destination volume is allowed

- Sync

  The operation mode of the copy session is displayed. If the status is " Reserved", a "-" (hyphen) is displayed.
  - Sync (synchronous)
  - Async (asynchronous)

- Transfer Mode

  The transfer mode of the copy session is displayed. If the "Status" is " Reserved", a "-" (hyphen) is displayed. If the "Sync" is "Sync", a "-" (hyphen) is displayed.
  - Stack Mode (Asynchronous Stack mode)
  - Consistency Mode (Asynchronous Consistency mode)
  - Through Mode (Asynchronous Through mode)

- Recovery Mode

  The recovery mode of the copy session is displayed. If the status is " Reserved", a "-" (hyphen) is displayed.
  - Automatic Recovery
    In this mode, copy automatically resumes when the copy path is recovered from error status.
  - Manual Recovery
    In this mode, copy does not automatically resume when the copy path is recovered from error status.

- Split Mode
  The split mode of the copy session is displayed. This item is available only for sessions in REC synchronous mode. If the status is " Reserved", a "-" (hyphen) is displayed. If the "Transfer Mode" is "Stack Mode" or "Consistency Mode", the field is blank.
  - Automatic
    In this mode, Write I/O access to the copy source volume is accepted when the copy path is in error status.
  - Manual
    In this mode, Write I/O access to the copy source volume is not accepted when the copy path is in error status. Specific sense data is sent to the host.

- Change Error
  The result of changing REC mode ("Transfer Mode", "Recovery Mode", or "Split Mode") and the result of REC reverse operation is displayed.
  When anything other than "Normal" is displayed, the operation mode may be different between the copy source and the copy destination storage systems, or REC reverse operation may disabled due to restriction in other functions.

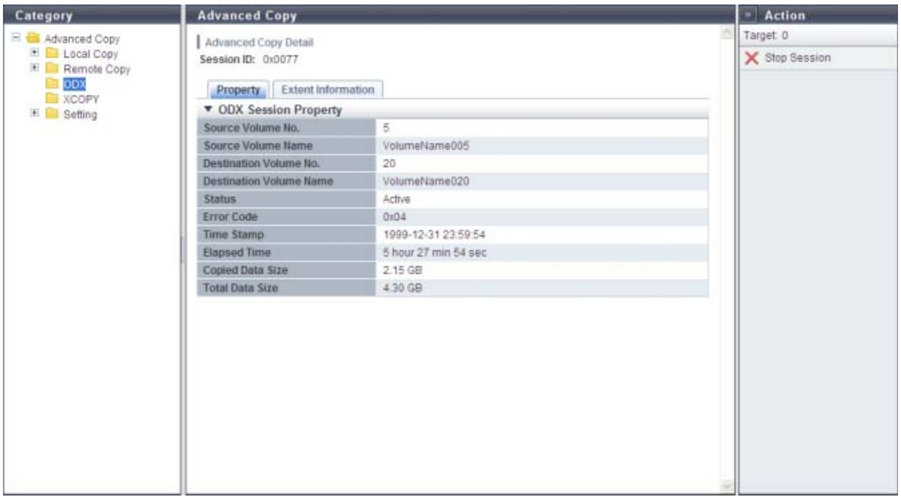
  If the status is " Reserved", a "-" (hyphen) is displayed.
  - Normal
    REC mode change and REC reverse operation are working normally
  - Mode Change Error
    An error was detected while changing the REC mode change
  - Reverse Error
    An error was detected while the REC reverse operation was being performed

- Concurrent Suspend Status
  When an instruction to collectively and tentatively separate multiple pairs of a copy source volume and a copy destination volume (Concurrent Suspend request) is received in REC session, transition status to "Suspend" is displayed. If the status is "✅ Reserved", a "-" (hyphen) is displayed. If the Concurrent Suspend Status cannot be obtained, "Unknown" is displayed.
  - Normal
    Transition to " Suspend" status is complete or Concurrent Suspend cannot be performed
  - Exec
    Transition to " Suspend" status is in progress
  - Error
    Transition to " Suspend" status failed
  - Unknown
    A status other than the ones listed above
- Remain Time
  The expected time to complete transition to "Suspend" when a Concurrent Suspend request is received.
  If the "Status" is "✅ Reserved", or if the "Remain Time" cannot be obtained, a "-" (hyphen) is displayed.

Note

Refer to "8.1.3 Advanced Copy (All Remote Sessions)" (page 261) for the display items that are not described in this section.

For ODX



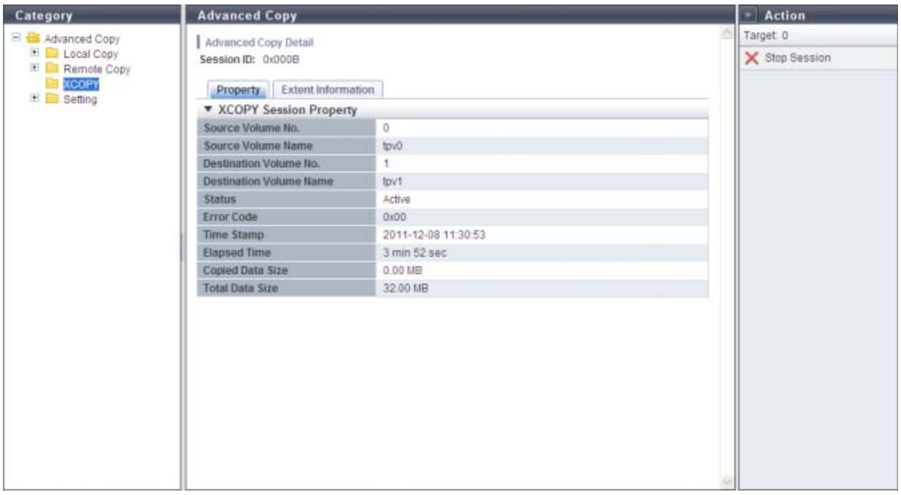
The following items are displayed in the Main area:

- Session ID
  The session ID selected in the [ODX] screen is displayed here.
- Source Volume Name
  The copy source volume name is displayed. If the "Status" is "✅ Reserved", a "-" (hyphen) is displayed.
- Destination Volume Name
  The copy destination volume name is displayed. If the "Status" is "✅ Reserved", a "-" (hyphen) is displayed.

Note

Refer to "8.1.4 Advanced Copy (ODX)" (page 265) for the display items that are not described in this section.

For XCOPY



The following items are displayed in the Main area:

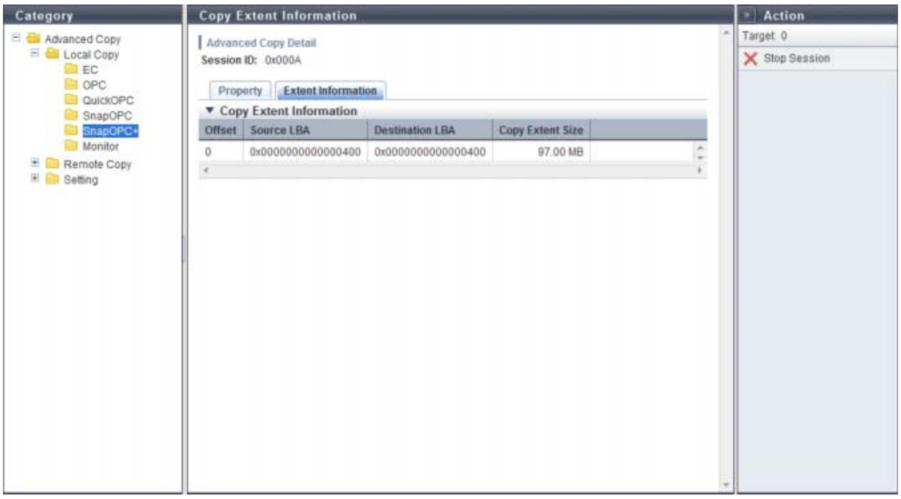
- Session ID
  The session ID selected in the [XCOPY] screen is displayed here.
- Source Volume Name
  The copy source volume name is displayed. If the "Status" is "Reserved", a "-" (hyphen) is displayed.
- Destination Volume Name
  The copy destination volume name is displayed. If the "Status" is "Reserved", a "-" (hyphen) is displayed.

Note

Refer to "8.1.5 Advanced Copy (XCOPY)" (page 266) for the display items that are not described in this section.

8.1.8 Advanced Copy (Extent information)

Detailed information (Extent information) about the Advanced Copy is displayed.
This screen is available only when the "Copy Range" is "Extent".

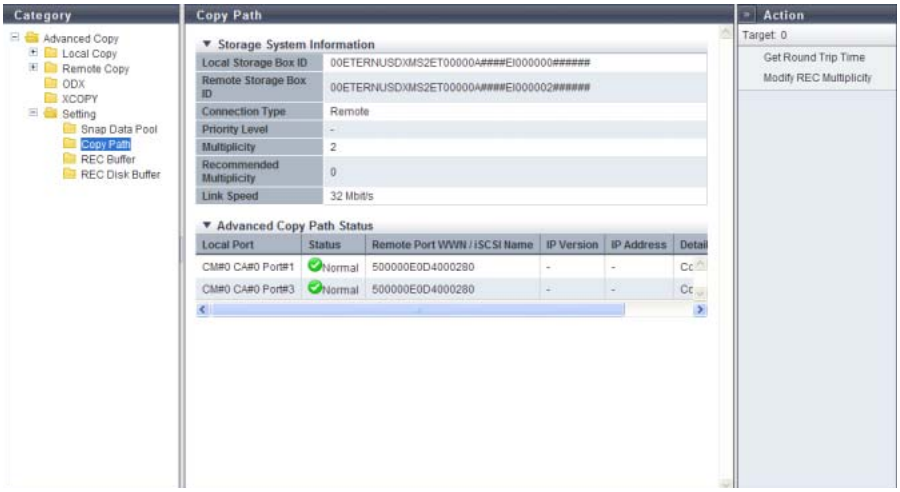


The following items are displayed in the Main area:

- Offset
  The array number of extent information is displayed.
- Source LBA
  The copy source start Logical Block Address (LBA) of copy with range specification is displayed.
- Destination LBA
  The copy destination start LBA of copy with range specification is displayed.
- Copy Extent Size
  The data amount for copy with range specification is displayed.

8.1.9 Copy Path Detail

Detailed information of copy path is displayed.



The following items are displayed in the Main area:

● Storage System Information

- Local Device Box ID
  The Box ID of the local device is displayed.
- Remote Device Box ID
  The Box ID of the selected remote device is displayed.
- Connection Type
  The connection type between the local device and the selected remote device is displayed.
  - Direct
  - Remote
- Priority Level
  When the local device and the selected remote device are connected by direct connection, the priority level is displayed. If the "Connection Type" is "Remote", a "-" (hyphen) is displayed.
- Multiplicity
  When the local device and the selected remote device are connected by remote connection, the multiplicity is displayed. If the "Connection Type" is "Direct", a "-" (hyphen) is displayed.
- Recommended Multiplicity
  When the local device and the selected remote device are connected by remote connection, the recommended multiplicity is displayed. If the "Connection Type" is "Direct", a "-" (hyphen) is displayed.
- Link Speed
  When the local device and the selected remote device are connected by remote connection, the link speed is displayed. If the "Connection Type" is "Direct", a "-" (hyphen) is displayed.

Advanced Copy Path Status

- Local Port
  The port information of the local device is displayed.
- Status
  The port path status between the local and remote devices is displayed with an icon and a character string.
  - Normal
    The copy path is in normal status.
  - Error
    The copy path is in error status
- Remote Port WWN/iSCSI Name
  The port WWN or iSCSI name of the remote device is displayed.
- IP Version
  When the port type is iSCSI, the IP version for the destination iSCSI port of the copy path is displayed.
  A "-" (hyphen) is displayed when the port type is FC.
  - IPv4
  - IPv6 (Link Local)
  - IPv6 (Connect IP)
  - "-" (hyphen)
- IP Address
  When the port type is iSCSI, the IP address for the destination iSCSI port of the copy path is displayed.
  The display format varies according to the IP version.
  A "-" (hyphen) is displayed when the port type is FC.
  - For IPv4 address
    - xxx.xxx.xxx.xxx
      xxx: 0 - 255 (decimal)
  - For IPv6 address
    - xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
      xxxx: 0 - ffff (hexadecimal, "a" - "f" are lowercase letters)
      Refer to "IPv6 Address Notation" (page 378) for details.
- Remote Port Mode
  The remote port mode is displayed. This item is displayed only when the remote device is ETERNUS6000.
  - Initiator
    A dedicated port for sending
  - Target
    A dedicated port for downloading

- Detail Information
  Detailed information about the copy path is displayed.
  If an error occurs in the copy path, the error details or location is displayed using the following abbreviations. If there are multiple error locations, multiple abbreviations are displayed.
  - Connectable
    The copy path is in normal status.
  - Path Unstable
    The copy path between the local device and remote device is in unstable status. For example, link-down repeatedly occurs in a certain period of time or communication fails.
  - Bitmap Resolution Mismatched
    The resolution settings are different between the local and remote devices.
  - Suspected Spot (D)
    The copy path settings may be invalid.
  - Suspected Spot (N)
    The error occurs in the remote device.
  - Suspected Spot (T)
    The error occurs in the FC-RA port or iSCSI-RA port on the remote device.
  - Suspected Spot (C)
    The error occurs in the cable.
  - Suspected Spot (O)
    The error occurs in an adapter that is not for a local or a remote device. This occurs only when the connection type is FC-AL.
  - Suspected Spot (S)
    The error occurs in the switch or switch settings.
  - Suspected Spot (I)
    The error occurs in the FC-RA port or iSCSI-RA port on the local device.
  - Suspected Spot (M)
    The error occurs in the memory.

8.2 Functions in the Action Area for Advanced Copy

When using functions in the Action area, select the desired function from the Action area that is displayed in the status display screen.
The functions in the Action area for Advanced Copy can be performed from the following display functions:

Functions in the Action area for Advanced Copy	Display function
Start SnapOPC+	• Advanced Copy (Basic Information) • Advanced Copy (All Local Sessions) • SnapOPC+ in Local Copy
Stop Copy Session	• Advanced Copy (Basic Information) • Advanced Copy (All Local Sessions) • EC in Local Copy • OPC in Local Copy • QuickOPC in Local Copy • SnapOPC in Local Copy • SnapOPC+ in Local Copy • Monitor in Local Copy • Advanced Copy (All Remote Sessions) • REC in Remote Copy
Register Advanced Copy License	• Setting (Advanced Copy)
Delete Advanced Copy License	
Modify EC/OPC Priority	
Modify Copy Table Size	
Enable ODX	
Disable ODX	
Create ODX Buffer Volume	
Modify Copy Parameters	• Snap Data Pool in Setting (Advanced Copy)
Set Copy Path	• Copy Path in Setting (Advanced Copy)
Delete All Copy Path	
Export All Copy Path	
Export Storage Information	
Convert Copy Path	
Measure Round Trip Time	
Modify REC Multiplicity	
Modify REC Buffer	• REC Buffer in Setting (Advanced Copy)
Assign REC Disk Buffer	
Create REC Disk Buffer	• REC Disk Buffer in Setting (Advanced Copy)
Delete REC Disk Buffer	
Format REC Disk Buffer	

8.2.1 Required Settings for the Advanced Copy Function

This section describes the necessary preparation that must be performed to use the Advanced Copy function and copy session management. Perform the required settings in the following order.

■ Required settings for the Advanced Copy function (Local Copy and Remote Copy)

● Advanced preparation

The following items must be prepared to use the Advanced Copy functions:

(1) License registration
Register a license for using the Advanced Copy function.
If a license is not registered, up to eight copy sessions can be performed (only for ETERNUS DX80 S2/DX90 S2).

Caution

When using an Advanced Copy function, refer to "8.2.4 Register Advanced Copy License" (page 295) to register the copy license.

(2) Copy destination volume creation
Create a copy destination physical volume according to the amount of updated data in the copy source volume. Create an SDV and an SDPV when performing SnapOPC+.
Refer to "5.2.1 Create Volume" (page 96).

Caution

- The RAID configuration of the copy source and copy destination can be different.
- The copy source and copy destination volume encryption status must match.

(3) Copy table size setting
Set the copy table size depending on the capacity of the copy target volume.
Refer to "8.2.7 Modify Copy Table Size" (page 301) and "How to calculate the copy table size" (page 308) for details.

(4) Copy priority setting
Specify the copy priority in the ETERNUS DX Disk storage system. It is not necessary to change the default setting (Automatic Priority) for normal use.
Refer to "8.2.6 Modify EC/OPC Priority" (page 298).
When performing SnapOPC+, the following preparations are also required.

Specify the automatic notification parameter when the SDP capacity is insufficient during a SnapOPC+ session.

(1) Copy parameter setting
Set the SDP capacity threshold for each policy level.
Refer to "8.2.11 Modify Copy Parameters" (page 316).

(2) Event notification setting
Select whether to notify when the SDP capacity exceeds the threshold. When notifying, select the notification method.
Refer to "11.2.9.1 Setup Event Notification" (page 880).

When performing REC, the following preparations are also required.

(1) Port mode setting
Change the port mode from "CA" (for host connection) to "RA" (for REC connection) or "CA/RA".
Refer to "9.2.3.11 Modify Port Mode" (page 571).

(2) Copy path setting
Set the Copy path information between local and remote devices.
Refer to "8.2.12 Set Copy Path" (page 318).

(3) REC Buffer setting
Set the transfer buffer when performing REC in asynchronous consistency mode.
Refer to "8.2.19 Modify REC Buffer" (page 354).

(4) REC Disk Buffer setting
Set the REC Disk Buffer that is used for saving copy data temporarily when the REC Buffer capacity is insufficient.
Refer to "8.2.21 Create REC Disk Buffer" (page 362).

(5) REC Disk Buffer allocation
Set REC Disk Buffer allocation.
Refer to "8.2.20 Assign REC Disk Buffer" (page 358).

(6) REC multiplicity setting
Set the multiplicity used for performing REC. It is not necessary to change the default setting (Automatic) for normal use.
Refer to "8.2.18 Modify REC Multiplicity" (page 351).

(7) Copy path conversion
Convert the copy path information file format to perform REC with an older ETERNUS Disk storage system. The copy path information file that is created using the procedure in "8.2.12 Set Copy Path" (page 318) can be converted.
Refer to "8.2.16 Convert Copy Path" (page 347).

When monitoring copy paths and sessions, the following preparations are also required.

(1) Event notification setting
Set whether to notify REC path errors, REC Buffer halt operations when overloading or failure occurs, session errors, and recovery from session errors. When notifying, select the notification method.
Refer to "11.2.9.1 Setup Event Notification" (page 880).

- Copy session management

After preparation for Advanced Copy is complete, create a copy session to start copying volumes. Check the copy session status during the copy operation.

(1) Copy session creation
Note that GUI can only create the SnapOPC+ sessions that are performed in volume units.
To create other copy sessions, use the copy management software. Refer to "8.2.2 Start SnapOPC+" (page 291).

(2) Copy session check
Check the status of each copy session in the "Advanced Copy Session Information" field.
Refer to "8.1.1 Advanced Copy (Basic Information)" (page 252).
For REC sessions, checking copy path and buffer status are also available.
Refer to "8.1.6.2 Copy Path" (page 271) and "8.1.6.3 REC Buffer" (page 273) for details.

Required settings for the Advanced Copy function (ODX)

- Advanced preparation

The following items must be prepared to use the ODX functions. The ODX function is supported by "Windows Server 2012".

(1) Enable ODX
Enable the ODX function. The ODX function is disabled by default.
Refer to "8.2.8 Enable ODX" (page 310) for details.

(2) Create an ODX Buffer volume
Create an ODX Buffer volume. No ODX Buffer volumes are registered by default.
Refer to "8.2.10 Create ODX Buffer Volume" (page 311) for details.

(3) Event notification setting
Set whether to notify insufficient ODX Buffer volume capacity, session errors, and recovery from session errors. When notifying, select the notification method.
Refer to "11.2.9.1 Setup Event Notification" (page 880).

Reboot any servers that are connected to the ETERNUS DX Disk storage system.

- Copy session management

After preparation for ODX copy is complete, create a copy session to start copying volumes. Check the copy session status during the copy operation.

(1) Copy session check
Check the status of each copy session in the "Advanced Copy Session Information" field.
Refer to "8.1.1 Advanced Copy (Basic Information)" (page 252).

● Stop ODX

The following items must be prepared after all the ODX sessions are complete or stopped:

(1) Delete an ODX Buffer volume
Delete the dedicated volumes for the ODX function.
Refer to "5.2.2 Delete Volume" (page 112) for details.

(2) Disable ODX
Disable the ODX function.
Refer to "8.2.9 Disable ODX" (page 311) for details.

Reboot any servers that are connected to the ETERNUS DX Disk storage system.

8.2.2 Start SnapOPC+

This function is used to select the copy source volume and copy destination volume, and start a new SnapOPC+ copy session.

Caution

- Only SnapOPC+ copy sessions that are performed in units of volumes can be created using GUI. To create EC sessions, OPC sessions, QuickOPC sessions, SnapOPC sessions, SnapOPC+ sessions using range selection, and REC sessions, use copy management software.
- When using SnapOPC+, SDVs are required as copy destination volumes. The "Capacity of source volume" that is specified when creating SDVs indicates the copy source Standard volume capacity. When creating an SDV using the [Create Volume] function, the capacity setting is not required. 24 (MB) + 0.1% of the copy source volume capacity is automatically secured in the ETERNUS DX Disk storage system. "24MB" is the smallest volume capacity. 0.1% of the copy source volume is the capacity that is used for the controlling information area in the SDV. When using SnapOPC or SnapOPC+, make sure to create an SDV and SDPVs. An SDPV is a volume that configures an SDP. The SDP allocates free space when SDV capacity is insufficient.
- An ODX Buffer volume cannot be specified as a copy source.

Note

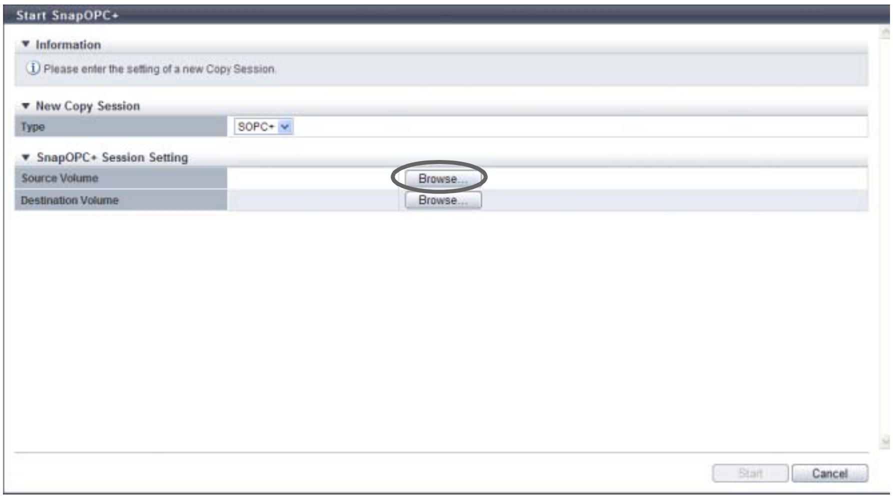
For controller firmware version V10L30 or later, the number of available generations for SnapOPC+ is 512.

The procedure to start the SnapOPC+ session is as follows:

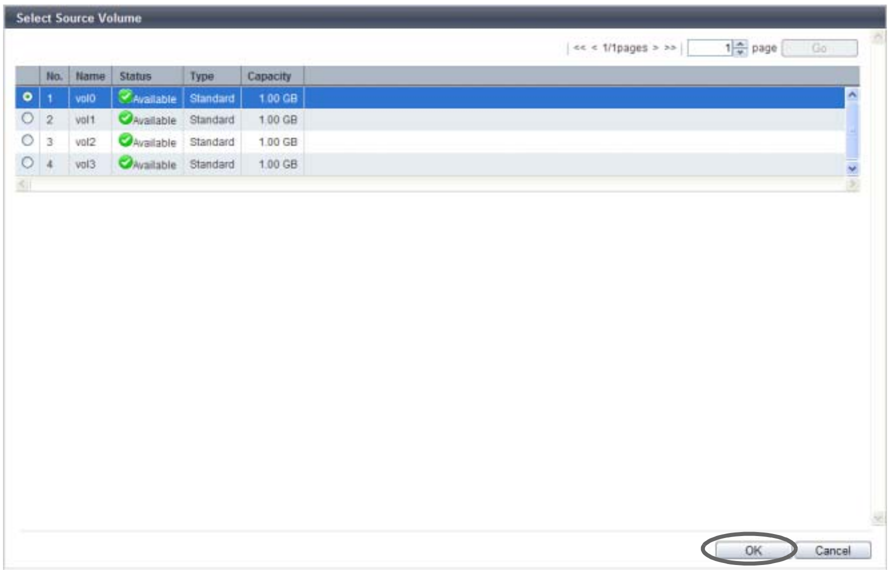
Procedure

1 Click [Start SnapOPC+] in [Action].

2 Click the [Browse...] button.

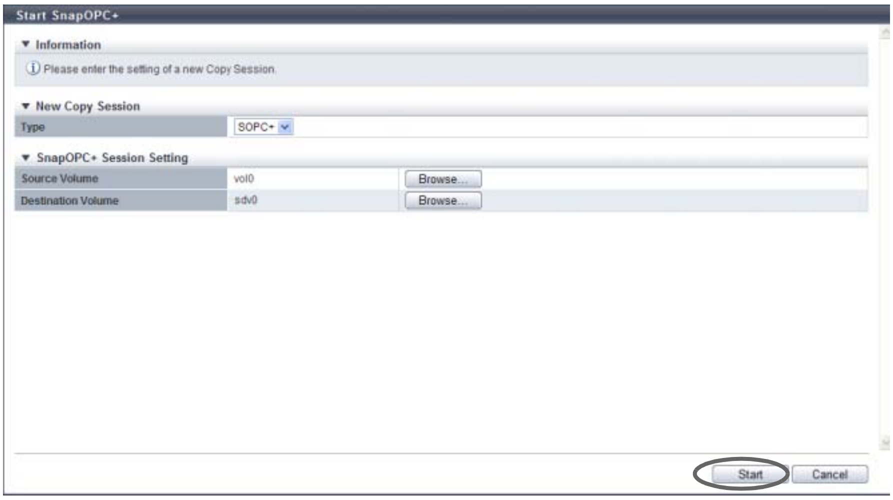


3 Select the radio button for the volume to be used, and click the [OK] button.



Perform Step 2 and Step 3 in the [Select Source Volume] screen and in the [Select Destination Volume] screen.

4 Check the displayed contents, and click the [Start] button.



→ A confirmation screen appears.

5 Click the [OK] button.



→ SnapOPC+ session starts.

Caution

An error screen appears in the following conditions:

- When the SnapOPC+ started in the copy source volume exceeds the maximum number of generations per volume
- When the SnapOPC+ started in the copy source volume exceeds the maximum number of copy sessions for the entire ETERNUS DX Disk storage system

6 Click the [Done] button to return to the [Advanced Copy] screen.

End of procedure

8.2.3 Stop Copy Session

This function stops the selected copy session.
This function is used when a session cannot be stopped due to a host error or other causes.

Caution

- If one SnapOPC+ session is stopped, all the sessions started earlier than that session are also stopped.
- If one SnapOPC+ session is stopped, all the Restore OPC sessions started earlier than that session become in error status.
- If a SnapOPC or SnapOPC+ session during a Restore OPC session is stopped, that Restore OPC session becomes in error status.

The procedure to stop a copy session is as follows:

Procedure

1 Select the copy session to be stopped (multiple selections can be made) and click [Stop Session] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ The selected copy session is stopped.

3 Click the [Done] button to return to the [Advanced Copy] screen.

End of procedure

8.2.4 Register Advanced Copy License

This function registers the Advanced Copy license for EC, OPC, QuickOPC, SnapOPC, SnapOPC+, and REC.
There are two types of Advanced Copy licenses:

- Paid License
  All of the Advanced Copy functions can be used.
- Free License
  For the ETERNUS DX80 S2/DX90 S2, up to eight sessions with the local Advanced Copy function can be used.

When this registration is complete successfully, the customer can use the Advanced Copy functions.

Caution

There are no free licenses for the ETERNUS DX410 S2/DX440 S2 or ETERNUS DX8100 S2/DX8700 S2

Note

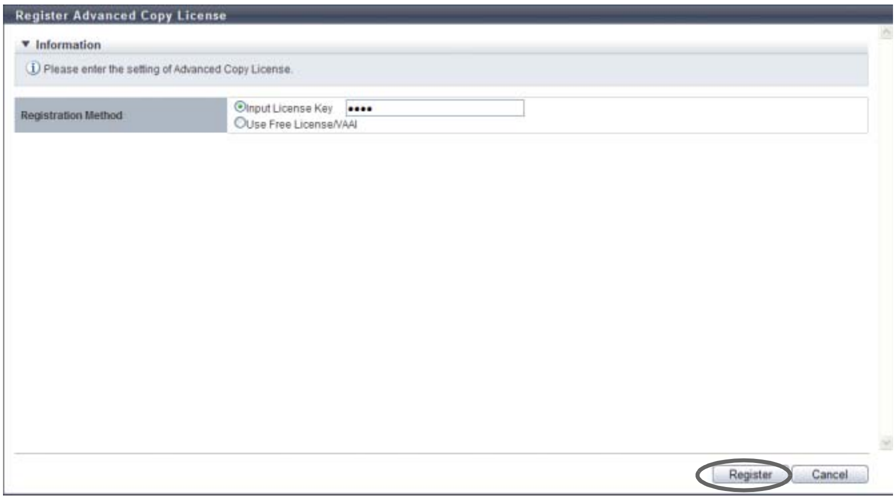
- When using ETERNUS SF AdvancedCopy Manager or ETERNUS SF Express, perform the required settings described in the documents that are supplied with ETERNUS SF AdvancedCopy Manager or ETERNUS SF Express.
- The registration status of the Advanced Copy license can be checked. Refer to "8.1.6 Setting (Advanced Copy)" (page 268) for details.

The procedure to register an Advanced Copy license is as follows:

Procedure

1. Click [Register License] in [Action].
2. Select a registration method, enter an Advanced Copy license key to be registered, and click the [Register] button.
   - Registration Method
     To register a paid license, select "Input License Key" and enter the Advanced Copy license key that is to be registered.
     When using the Full Copy function of VMware vStorage APIs for Array Integration (VAAI) with controller firmware version V10L20 or later, registering an Advanced Copy license is not required.
     When using a free license for the ETERNUS DX80 S2/DX90 S2, select "Use Free License/VAAI".
     If the Advanced Copy license is already registered, "Use Free License/ VAAI" and "Use VAAI" cannot be selected.
     Refer to "Availability of Copy Functions" (page 297) for the availability of copy functions when selecting "Use Free License/VAAI" or "Use VAAI".

- Input License key
  Input the Advanced Copy license key.



→ A confirmation screen appears.

Caution

- Only when registering a paid license, the Advanced Copy license key entry is required.
- When the entered Advanced Copy license key does not satisfy the input conditions, an error screen appears.

3 Click the [OK] button.



→ The Advanced Copy license registration is executed.

4 Click the [Done] button to return to the [Setting] screen.

End of procedure

Availability of Copy Functions

The following table shows the availability of copy functions when "Use Free License/ VAAI" or "Use VAAI" is selected.

Copy Type		ETERNUS DX80 S2/DX90 S2	ETERNUS DX410 S2/DX440 S2 ETERNUS DX8100 S2/DX8700 S2
		Use Free License/VAAI	Use VAAI
Advanced Copy	Local	OK (Up to eight sessions)	NG
	Remote	NG	NG
Full Copy by VAAI		OK	OK

8.2.5 Delete Advanced Copy License

This function deletes all of the Advanced Copy licenses registered in the ETERNUS DX Disk storage system.

Caution

- An Advanced Copy license cannot be deleted in the following conditions:
  - When the CM status is other than "Normal"
  - When an SDV or an SDPV has been registered
  - When a volume that is Advanced Copy protected exists
  - When an Advanced Copy session (except for an ODX session or an XCOPY session) exists
  - When an Advanced Copy table size has been configured
  - When an Advanced Copy path has been configured
  - When REC Buffer has been configured
  - When REC Disk Buffer has been created
  - When a port with the RA mode exists
  - When a port with the CA/RA mode exists
- Rebooting the ETERNUS DX Disk storage system is required after deleting an Advanced Copy license.

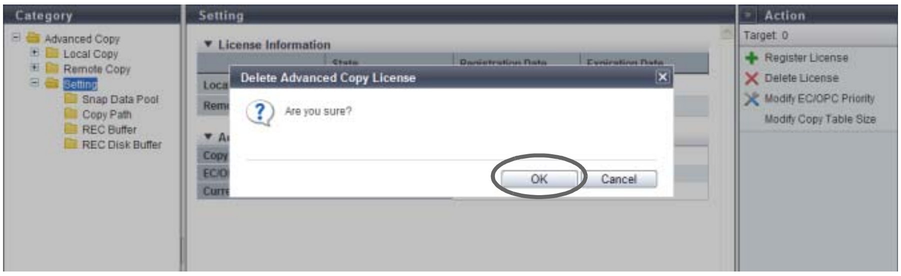
The procedure to delete an Advanced Copy license is as follows:

Procedure

1 Click [Delete License] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ Deletion of an Advanced Copy license is executed.

3 Click the [Done] button to return to the [Setting] screen.

End of procedure

8.2.6 Modify EC/OPC Priority

This function sets the copy speed when using EC and OPC.
The EC/OPC speed is usually set in consideration of the host's I/O load and copy processing load. The set EC/OPC speed is applied not only for the next sessions, but also for existing sessions.

Caution

Registering the license for the Advanced Copy feature is required to use EC and OPC.

Note

- EC includes both EC and REC.
  Even though the REC priority is specified using the procedure in "8.2.18 Modify REC Multiplicity" (page 351), the EC/OPC priority values specified with this function are applied only when the REC satisfies both of the following conditions:
  - When the connection method is "Direct"
  - When the priority level is "Auto"

  Refer to "8.2.12 Set Copy Path" (page 318) for connection type settings.
  Refer to "8.2.18 Modify REC Multiplicity" (page 351) for priority level settings.
- OPC includes OPC, QuickOPC, SnapOPC, and SnapOPC+.
- When "Auto" is selected for "EC/OPC Priority", the current priority level can be checked. Refer to "8.1.6 Setting (Advanced Copy)" (page 268) for details.

The procedure to modify the EC/OPC priority is as follows:

Procedure

1 Click [Modify EC/OPC Priority] in [Action].

2 Select the EC/OPC priority, and click the [Set] button.

- EC/OPC Priority
  - Automatic Priority
    This mode changes the EC/OPC priority automatically in response to the operating load status.
  - High Priority
    This mode operates by making maximum use of internal resources.
    This mode greatly affects host access performance, thus should not be used during normal operation. Use when the operation load is low.
  - Middle Priority
    This mode operates slightly slower than the High Priority mode.
    Select this mode when performance is greatly affected by the High Priority mode, but the copy speed is too slow with the Low Priority mode.
  - Low Priority
    This mode reduces the effect on host access.
    Select this mode when using EC and/or OPC during operation.
  - Very Low Priority
    This mode operates slower than the Low Priority mode.
    Select this mode when performance is affected (such as when the performance of host response is reduced) by the Automatic Priority or Low Priority mode.

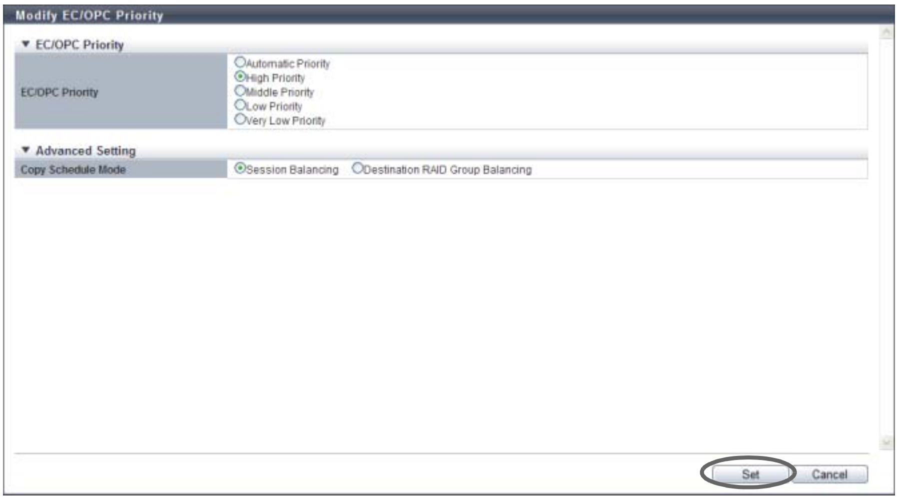
Advanced Setting

- Copy Schedule Mode
  Specify the schedule mode for EC, OPC, and Quick OPC. Use "Session Balancing" for normal operation.
  Setting the schedule mode for SnapOPC and SnapOPC + is not required.
  Use the [Modify REC Multiplicity] function to specify the REC schedule mode.
  - Session Balancing
    Copy sessions are scheduled evenly to each controlling CM-CPU for a copy source RAID group (a RAID group to which the copy source volume belongs).
  - Destination RAID Group Balancing
    Only one copy session can be performed for each copy destination RAID group. This method prevents unequal loading on a specific RAID group. This may improve the copy performance when a copy destination RAID group is configured by Nearline disks or when "High Priority" is set for EC/OPC.

Caution

Copy performance is not improved by selecting "Destination RAID Group Balancing" in the following conditions:

- When the type of the copy destination volume is not "Standard"
- When the copy destination volume "Standard" and concatenated



→ A confirmation screen appears.

Note

Click [Advanced Setting] to specify the copy schedule mode.

3 Click the [OK] button.



→ The selected EC/OPC priority is set.

4 Click the [Done] button to return to the [Setting] screen.

End of procedure

8.2.7 Modify Copy Table Size

This function sets the copy table size, which is used by the firmware for the ETERNUS DX Disk storage system, on the CM cache memory. When the EC, OPC or REC function is in use, this copy table is used as the area that manages the progress of the copy.

Caution

- Registering the license for the Advanced Copy function is required to set the copy table size.
- When the copy table size is equal to 0MB, copy functions cannot be used. The initial (factory default) copy table size setting is 0MB. Modify the copy table size before using the copy function.
- Make sure to stop the copy session before reducing the copy table size. To check the copy session, refer to "8.1.1 Advanced Copy (Basic Information)" (page 252).
- The following shows the maximum copy table size for each model.
  - ETERNUS DX80 S2/DX90 S2: 256MB
  - ETERNUS DX410 S2: 512MB
  - ETERNUS DX440 S2: 4096MB
  - ETERNUS DX8100 S2: 1024MB
  - ETERNUS DX8700 S2: 12288MB
- Cache memory is not only used for the copy table, but also used for REC Buffers. Note that a copy table with the maximum capacity for each model cannot always be created. Whether a copy table with the maximum capacity can be created depends on the memory capacity in the ETERNUS DX Disk storage system and the cache memory allocation of the REC Buffer.
- If the copy table size is not sufficient, an error occurs in the copy session. Make sure to specify the "Table Size Threshold" value to monitor the usage of the copy table in advance. The ETERNUS DX Disk storage system reports the notification using the method specified in "11.2.9.1 Setup Event Notification" (page 880). There are three methods for notification; E-mail, SNMP Trap, and syslog. When reporting, select the notification method in advance.
- Set the resolution as small as possible. When a large value is specified, the performance may be reduced. When unsure about whether the copy target area might be increased in future use, specify "× 16" for "Resolution".
- The same resolution must be used by both the copy source and copy destination storage system for REC. If the resolution settings for the copy source and copy destination storage systems are different, REC cannot be performed. Note that the copy table sizes do not need to be the same. If different recommended resolutions are calculated for the copy source and copy destination storage systems, use whichever resolution is greater for both storage systems. If the resolution is changed, recalculate the copy table size setting for the storage system with the new resolution.

Note

- Changes to the resolution setting are applied from the next session. For a copy session that is currently being performed, data is copied with the resolution that was specified when the session was started. To change the resolution of a copy session that is currently being performed, cancel the copy session and start again.
- When the table size or the table size threshold is changed, the new value is applied immediately.

There are two methods to set the copy table size: manually and automatically.
The procedure to set the copy table size is as follows:

Manually setting the copy table size

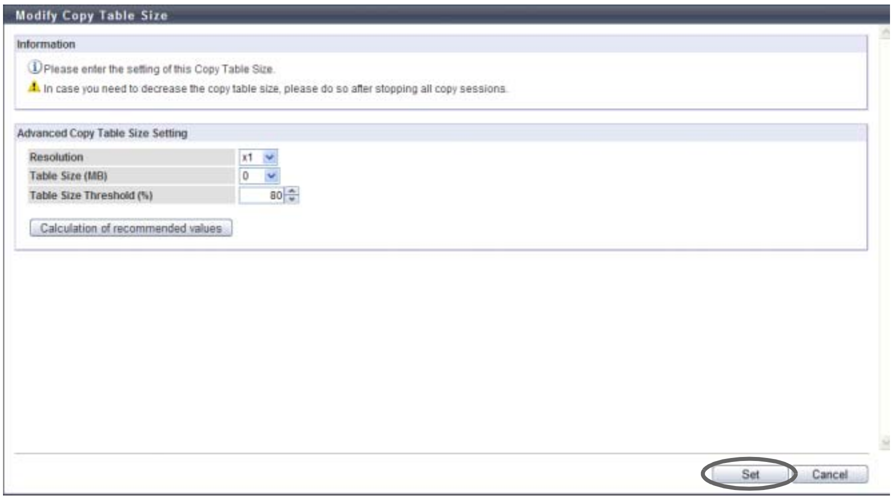
Specify the copy table size manually.

Procedure

1. Click [Modify Copy Table Size] in [Action].
2. Specify "Resolution" and "Table Size" and click the [Set] button.
   - Resolution
     Select the resolution.
     - × 1
     - × 2
     - × 4
     - × 8
     - × 16
   - Table Size (MB)
     Specify the copy table size.
     The maximum size that can be specified is an estimated value from the memory capacity in the ETERNUS DX Disk storage system and the amount of memory allocation for the REC Buffers.
     The maximum copy table size for each model is as follows:
     - ETERNUS DX80 S2/DX90 S2: 0 - 256 (MB) (integral multiple of 8)
     - ETERNUS DX410 S2: 0 - 512 (MB) (integral multiple of 8)
     - ETERNUS DX440 S2: 0 - 4096 (MB) (integral multiple of 8)
     - ETERNUS DX8100 S2: 0 - 1024 (MB) (integral multiple of 8)
     - ETERNUS DX8700 S2: 0 - 12288 (MB) (integral multiple of 8)
   - Table Size Threshold (%)
     Specify the threshold for monitoring the used capacity of the copy table.
     To report when the used capacity exceeds the threshold, enable event notification by using the procedure in "11.2.9.1 Setup Event Notification" (page 880) and select E-mail, SNMP Trap, or syslog for the notification method.

     Note

     - Refer to "How to calculate the copy table size" (page 308) for detailed procedure to calculate the copy table size.
     - Refer to "Appendix H Estimated Advanced Copy Source Capacity" for the maximum copy source capacity.



→ A confirmation screen appears.

3 Click the [OK] button.



→ Setting of the copy table size starts.

4 Click the [Done] button to return to the [Setting] screen.

End of procedure

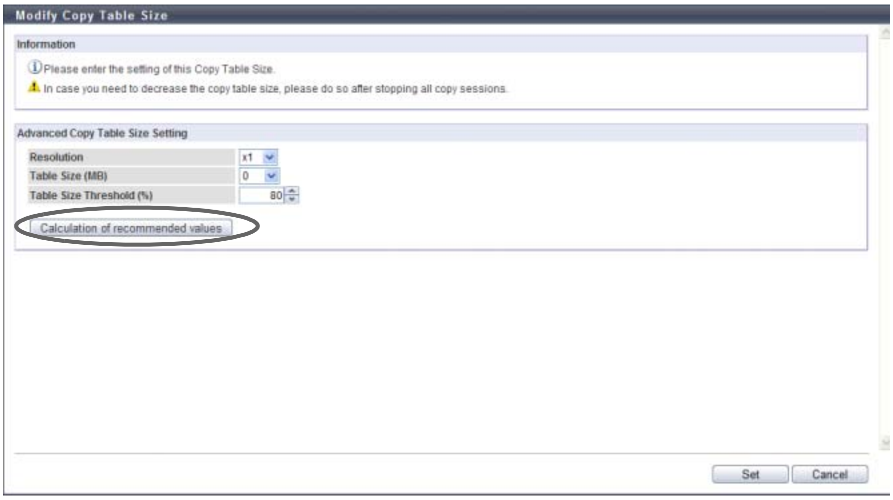
Automatically setting the copy table size

Specify the copy table size automatically.

Procedure

1 Click [Modify Copy Table Size] in [Action].

2 Click the [Calculation of recommended values] button.



→ The [Calculation of recommended values] dialog box appears.

3 Input the necessary information and click the [Calculation] button.

- Total Copy Capacity (Restore OPC is not used)
  Input the total copy capacity (*1) when Restore OPC is not used (unit: GB). The applicable Advanced Copy types are as follows:
  - EC
  - REC
  - OPC, QuickOPC, SnapOPC, and SnapOPC+ without using Restore OPC

  The following input conditions apply:
  - ETERNUS DX80 S2/DX90 S2: 0 - 262144GB (256TB)
  - ETERNUS DX410 S2: 0 - 524288GB (512TB)
  - ETERNUS DX440 S2: 0 - 4194304GB (4096TB)
  - ETERNUS DX8100 S2: 0 - 1048576GB (1024TB)
  - ETERNUS DX8700 S2: 0 - 12582912GB (12288TB)
- Total Copy Capacity (Restore OPC is used)
  Input the total copy capacity (*1) for using Restore OPC (unit: GB).
  The applicable Advanced Copy types are as follows:
  - OPC, QuickOPC, SnapOPC, and SnapOPC+ using Restore OPC

  The following input conditions apply:
  - ETERNUS DX80 S2/DX90 S2: 0 - 262144GB (256TB)
  - ETERNUS DX410 S2: 0 - 524288GB (512TB)
  - ETERNUS DX440 S2: 0 - 4194304GB (4096TB)
  - ETERNUS DX8100 S2: 0 - 1048576GB (1024TB)
  - ETERNUS DX8700 S: 0 - 12582912GB (12288TB)
- Sessions (Restore OPC is not used)
  Input the total number of sessions (*1) for not using Restore OPC.
  The applicable Advanced Copy types are as follows:
  - EC
  - REC
  - OPC, QuickOPC, SnapOPC, and SnapOPC+ without using Restore OPC

The following input conditions apply:

- ETERNUS DX80 S2: 0 - 1024
- ETERNUS DX90 S2: 0 - 2048
- ETERNUS DX410 S2/DX440 S2: 0 - 8192
- ETERNUS DX8100 S2: 0 - 8192
- ETERNUS DX8700 S2: 0 - 32768

• Sessions (Restore OPC is used)
Input the total number of sessions (*1) for using Restore OPC.
The applicable Advanced Copy types are as follows:
  - OPC, QuickOPC, SnapOPC, and SnapOPC+ using Restore OPC

  The following input conditions apply:
  - ETERNUS DX80 S2: 0 - 1024
  - ETERNUS DX90 S2: 0 - 2048
  - ETERNUS DX410 S2/DX440 S2: 0 - 8192
  - ETERNUS DX8100 S2: 0 - 8192
  - ETERNUS DX8700 S2: 0 - 32768

*1: For "Total Copy Capacity" and "Sessions", enter the respective total values.
[Example 1]
When executing 10GB OPC (Restore OPC is not used) with 20 sessions and 5GB QuickOPC (Restore OPC is not used) with 10 sessions

Total Copy Capacity (Restore OPC is not used)
= Copy capacity for OPC (10GB x 20 sessions) +
Copy capacity for QuickOPC (5GB x 10 sessions)
= 200GB + 50GB = 250GB

Sessions (Restore OPC is not used)
= The number of OPC sessions (20 sessions) +
The number of QuickOPC sessions (10 sessions)
= 30 sessions

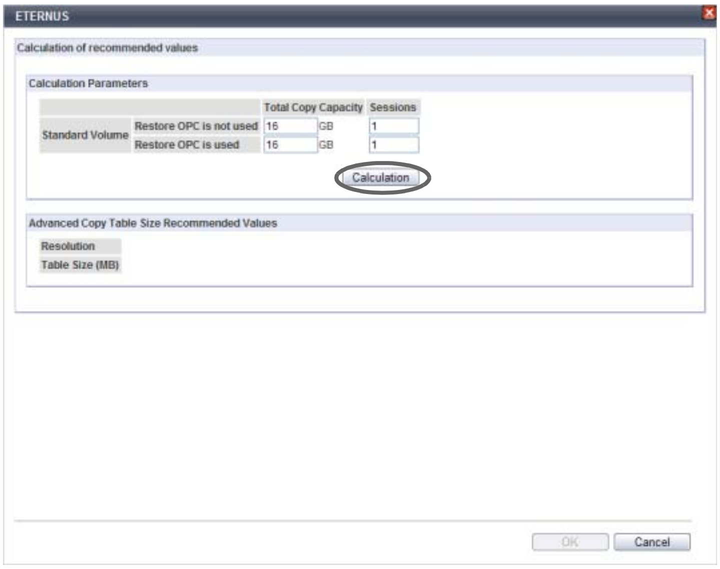
Example 2:
When executing 10GB OPC (Restore OPC is not used) with 20 sessions and 5GB QuickOPC (Restore OPC is used) with 10 sessions

Total Copy Capacity (Restore OPC is not used)
= Copy capacity for OPC (10GB x 20 sessions) = 200GB

Sessions (Restore OPC is not used)
= The number of OPC sessions (20 sessions) = 20 sessions

Total Copy Capacity (Restore OPC is used)
= Copy capacity for QuickOPC (5GB x 10 sessions) = 50GB

Sessions (Restore OPC is used)
= The number of QuickOPC sessions (10 sessions) = 10 sessions

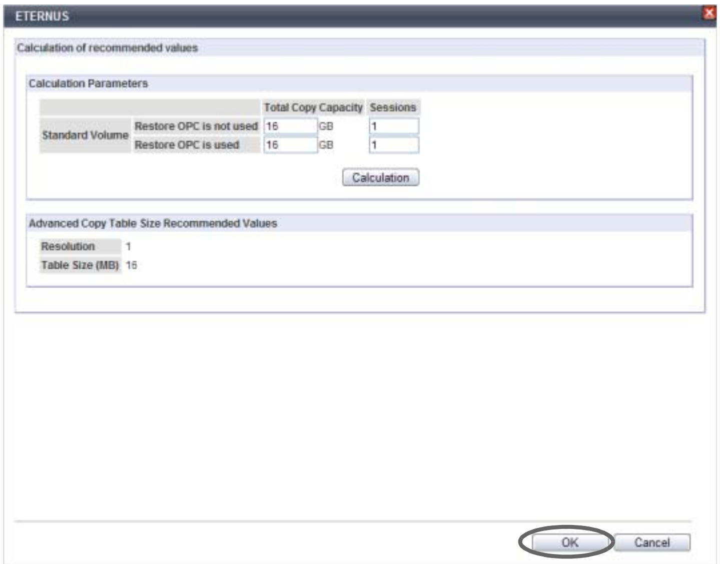


→ "Resolution" and "Table Size" are automatically calculated.

Note

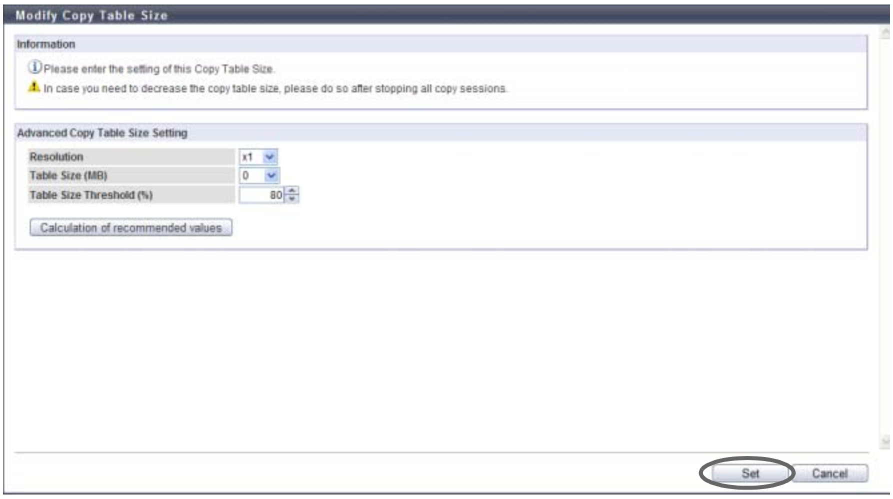
- The calculated parameters are "Resolution" and "Table Size". It is assumed that almost 100% of the copy table size is used.
- When [Calculation of recommended values] is used, the calculation of "Resolution" and "Table Size" makes allowances for a slight increase of the copy capacity. This is why the calculated values are higher than values obtained using the procedure described in "How to calculate the copy table size" (page 308).

4 Click the [OK] button.



→ The calculated values are reflected to "Resolution" and "Table Size" in the "Advanced Copy Table Size Setting" field.

5 Click the [Set] button.



→ A confirmation screen appears.

6 Click the [OK] button.



→ Setting of the copy table size starts.

7 Click the [Done] button to return to the [Setting] screen.

End of procedure

How to calculate the copy table size

A dedicated memory area is required for Advanced Copy management and is allocated as a table size. The table size and resolution settings are determined by the copy capacity and the number of sessions (volumes) that will be run simultaneously.

(Table size (S)) [MB] = (S1) + (S2)

S1: Refers to the table size (MB) for EC/REC and for OPC/QuickOPC/SnapOPC/SnapOPC+ without OPC Restoration.
S2: Refers to the table size (MB) for OPC/QuickOPC/SnapOPC/SnapOPC+ with OPC Restoration.

Caution

- Round the derived value up to the next multiple of 8 to obtain the correct setting for the copy table size.
- A copy table of the appropriate size (as derived above) is created in each CM.
- If the total table size value (S) exceeds the maximum size allowed, adjust the resolution (M) upward until the maximum table size is no longer exceeded. The resolution (M) should be as small as possible.
- Maximum allowed table sizes are as follows:

Storage system name	Maximum copy table size (per CM)
ETERNUS DX80 S2	256MB
ETERNUS DX90 S2	256MB
ETERNUS DX410 S2	512MB
ETERNUS DX440 S2	4096MB
ETERNUS DX8100 S2	1024MB
ETERNUS DX8700 S2	12288MB

- Allowance should be made for possible increases in the copy capacity.
- If the resolution is changed during an existing copy session, the table sizing formula described in this section is not applied.
- The same bitmap ratio (M) value must be used by both the copy source and copy destination storage systems. If the bitmap ratio settings for the copy source and copy destination storage systems are different, REC cannot be performed. Note that the table sizes (S) do not need to be identical. If different recommended resolutions are calculated for the copy source and copy destination storage systems, use whichever resolution is greater for both storage systems. If the resolution (M) is changed, recalculate the table size (S) setting for the storage system with the new resolution.

Note

The calculated parameters are "Resolution (M)" and "Table Size (S)". It is assumed that almost 100% of the copy table size is used.

- The table size for EC/REC and for OPC/QuickOPC/SnapOPC/SnapOPC+ without OPC Restoration (S1)

M: Resolution (The same value is used in the ETERNUS DX Disk storage system. Set "×1" if possible.)

C1: The total copy capacity (GB) for EC/REC, and OPC/QuickOPC/SnapOPC/SnapOPC+ without OPC Restoration (*1)

N1: The number of sessions EC/REC, and OPC/QuickOPC/SnapOPC/SnapOPC+ without OPC Restoration.

$$S1\ [MB] = ((2 \times C1 / M) + N1) \times 8\ [KB] / 1024 \text{ (Round up decimal point)}$$

- The table size for OPC/QuickOPC/SnapOPC/SnapOPC+ with OPC Restoration (S2)

M: Resolution (The same value is used in the ETERNUS DX Disk storage system. Set "×1" if possible.)

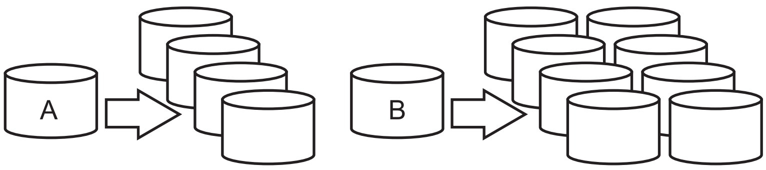
C2: The total copy capacity (GB) for OPC/QuickOPC/SnapOPC/SnapOPC+ with OPC Restoration in the volume (*1)

N2: The number of sessions for OPC/QuickOPC/SnapOPC/SnapOPC+ with OPC Restoration

$$S2\ [MB] = ((2 \times C2 / M) + N2) \times 2 \times 8\ [KB] / 1024 \text{ (Round up decimal point)}$$

*1: For EC, OPC, QuickOPC, SnapOPC, SnapOPC+, and REC copy sources, the copy capacity is the total capacity of all volumes (slices or partitions) in the ETERNUS DX Disk storage system that are defined as copy sources. For REC copy destinations, the copy capacity is the total capacity of all the volumes (slices or partitions) in the ETERNUS DX Disk storage system that are defined as copy destinations.
If the ETERNUS DX Disk storage system is used for both the " EC, OPC, QuickOPC, SnapOPC, SnapOPC+, or REC copy source" and the " REC copy source", the copy capacity is the total capacity of both.

For multi-copy sessions, the copy capacity is the total capacity of multi-copy source volumes (slices or partitions), multiplied by the number of multi-copy destinations for each copy source. The copy capacity for generation management by SnapOPC+ sessions is the total capacity of copy source volumes (slices or partitions) multiplied by the number of generations in the copy destination volumes for each copy source.
Example for multi-copy sessions:



Copy area in the copy source logical volume A: 200M, Number of multi-copy destinations: 4
Copy area in the copy source logical volume B: 500MB, Number of multi-copy destinations: 8
Add 200 × 4 + 500 × 8 = 4800MB to the copy capacity (C1).
Note that "4" and "8" in this example correspond to the number of generations when calculating the copy table size for SnapOPC+ sessions.

The number of sessions (N1) for multi-copy and SnapOPC+ is 4 + 8 = 12.
When executing OPC Restoration from a copy destination with multi-copy and SnapOPC+ multi-generation enabled, select one copy destination and apply the above formula. Other copy destinations are calculated as being normal multi-copy and SnapOPC+ multi-generation.

8.2.8 Enable ODX

This function enables the ODX function.
This function supports ODX, which is provided for servers with "Windows Server 2012". ODX is a function that offloads the load on data copying and migration to the storage system.

Caution

- To start using the ODX function, the server must recognize that ODX is enabled in the ETERNUS DX Disk storage system. After enabling ODX with this function, reboot the server.
- ODX requires dedicated volumes (ODX Buffer volumes) to save data before updating. ODX Buffer volumes can be created after ODX is enabled. Refer to "8.2.10 Create ODX Buffer Volume" (page 311) for details.
- The ETERNUS DX Disk storage system does not support an Advanced Copy when the copy destination is a volume that is being used by the ODX function.
- The ODX function only supports copying within the same ETERNUS DX Disk storage system. Copying to other storage systems is not supported.

Note

ODX does not require the registration of an Advanced Copy license and copy table size settings.

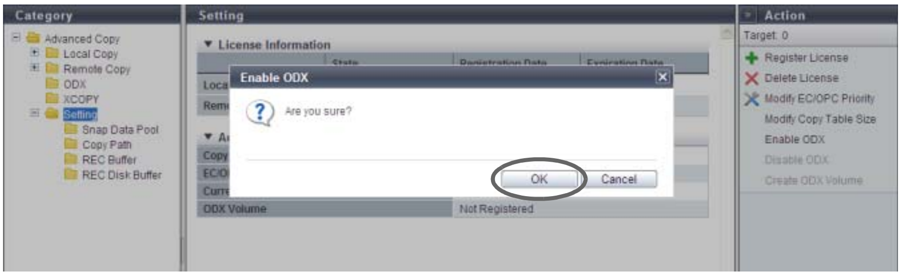
The procedure to enable the ODX function is as follows:

Procedure

1 Click [Enable ODX] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ Enabling of ODX starts.

3 Click the [Done] button to return to the [Setting] screen.

End of procedure

8.2.9 Disable ODX

This function disables the ODX function.

Caution

- To stop using the ODX function, the server must recognize that ODX is disabled in the ETERNUS DX Disk storage system. After disabling ODX with this function, reboot the server.
- The ODX function cannot be disabled when ODX Buffer volumes exist in the ETERNUS DX Disk storage system.

Note

Delete the ODX Buffer volume before disabling the ODX function. Refer to "5.2.2 Delete Volume" (page 112) for details.

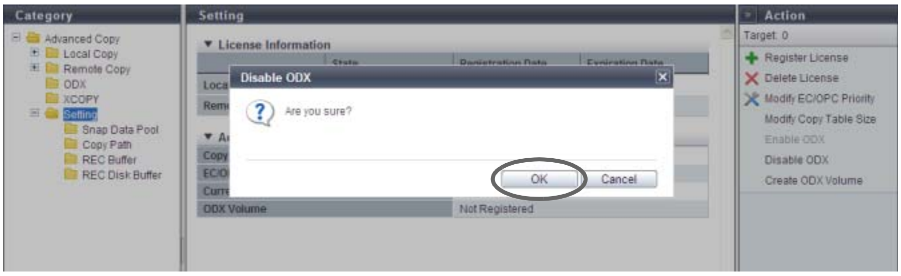
The procedure to disable the ODX function is as follows:

Procedure

1 Click [Disable ODX] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ Disabling of ODX starts.

3 Click the [Done] button to return to the [Setting] screen.

End of procedure

8.2.10 Create ODX Buffer Volume

This function creates a dedicated volume for the ODX function.
ODX is a function that offloads the load on data copying and migration to the storage system. ODX copies data at the time when a copy request is received. If a Write command is issued for the copy source data, this function backs up the previous data in the area that is to be overwritten. An ODX Buffer volume is used to store the backup data at this time.
The ODX function is supported by "Windows Server 2012".

ODX Buffer Volume

- One ODX Buffer volume can be created in the ETERNUS DX Disk storage system.
- The type of the ODX Buffer volume is "Standard", "TPV", or "FTV".
- The capacity of an ODX Buffer volume is 1GB - 1TB.

Caution

- An ODX Buffer volume can be created when the ODX function is enabled.
- The ODX Buffer volume must be created with the ODX function.
- If a Thin Provisioning license is not registered, a "TPV" or an "FTV" type ODX Buffer volume cannot be created.
- When creating an "FTV" type ODX Buffer volume, use CLI. GUI cannot be used to create an "FTV" type ODX Buffer volume.
- When encryption mode is disabled, an ODX Buffer volume encrypted by CM cannot be created. Note that when SEDs are not installed in the ETERNUS DX Disk storage system, an ODX Buffer volume encrypted by SEDs cannot be created.
- If the maximum number of volumes is already registered in the ETERNUS DX Disk storage system, an ODX Buffer volume cannot be created. Refer to "5.2.1 Create Volume" (page 96) to check the maximum number of volumes for the ETERNUS DX Disk storage system.
- If the maximum capacity for TPVs or FTVs is already registered in the ETERNUS DX Disk storage system, a "TPV" type or an "FTV" type ODX Buffer volume cannot be created. Refer to "5.2.1 Create Volume" (page 96) to check the maximum capacity.

Note

- Only one ODX Buffer volume can be created in the ETERNUS DX Disk storage system. Use the [Setting] screen to check whether an ODX Buffer volume is already created. Refer to "8.1.6 Setting (Advanced Copy)" (page 268) for details.
- An existing ODX Buffer volume can be checked by using the "Forbid Advanced Copy" field in the [Volume] screen. Refer to "5.1.1 Volume (Basic Information)" (page 74) for details.
- There are three types of ODX Buffer volumes: "Standard", "TPV", and "FTV". When creating an ODX Buffer volume in a RAID group, select "Standard" for the volume type. When creating an ODX Buffer volume in a TPP, select "Thin Provisioning" for the volume type. When creating an ODX Buffer volume in an FTRP, use CLI. The ODX Buffer volume type is independent of the copy source volume type or the copy destination volume type.
- Even when the ODX Buffer volume capacity is insufficient, no error occurs in an ODX session that is already started. Windows Server suspends the use of ODX, and starts a normal copy process that uses Read and Write processes.
- Monitoring the usage of an ODX Buffer volume is available. If insufficient capacity is detected, the ETERNUS DX Disk storage system sends a notification. Refer to "11.2.9.1 Setup Event Notification" (page 880) for details. If the ODX Buffer volume capacity is frequently insufficient, the benefit of using the ODX function is lost. Expand the ODX Buffer volume capacity as required. Refer to "5.2.5 Expand Volume" (page 117), "5.2.7 Start RAID Migration" (page 123), or "5.2.6 Expand Thin Provisioning Volume" (page 121) for details.
- An ODX Buffer volume can be deleted by using the same procedure as "Standard" and "TPV" type volumes if the ODX function is not used. Refer to "5.2.2 Delete Volume" (page 112) for details. To delete an "FTV" type ODX Buffer volume, use CLI.

- The volume capacity that is required for an ODX Buffer volume varies depending on the server system configuration and the applications that are being used. When using the ODX function for normal file copying or file migration with Microsoft Windows Server, creating a 10GB ODX Buffer volume is recommended.
- An ODX Buffer volume can be created by using the maximum free space that is available in a RAID group. Inputting the volume capacity is not required. "Standard" type volumes can be created using the maximum free space.

The procedure to create an ODX Buffer volume is as follows:

Procedure

1 Click [Create ODX Buffer Volume] in [Action].

2 Specify the detailed information of the ODX Buffer volume and select the RAID group or TPP in which the ODX Buffer volume is to be created. Click the [Create] button.

- Name
  Specify the ODX Buffer volume name. An existing volume name cannot be specified.
  The following input condition applies:
  - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")
- Capacity
  Specify the volume capacity between "1GB" - "1TB", and select the unit of capacity (MB/GB/TB).
  Up to a 15-digit number including the "." (decimal point) can be input. Note that when "MB" is selected, the specified value is rounded down to the nearest whole number. When "GB" or "TB" is selected, the specified value is converted to "MB" and rounded down to the nearest whole number.

  Note

  Up to 15 numbers can be used. If a decimal point is included in the input value, up to 14 numbers can be used.
  [Example] 0.1234567890123 (14 numbers and a decimal point)

  Caution

  If "Use all Largest Free Space" is selected, inputting the capacity is not required. The specified value and unit are not used.

- Type
  Specify the volume type. If a Thin Provisioning license is not registered, "Standard" is displayed in this field.
  - Standard
    A volume that is created in the RAID group.
  - Thin Provisioning
    A volume that is created in Thin Provisioning Pools.

- Use all Largest Free Space
  Select the "Enable" checkbox to create an ODX Buffer volume with the largest available free space in the RAID group. This checkbox can be selected or cleared only when "Type" is "Standard".
  If "Enable" is selected, an ODX Buffer volume with a capacity of up to 1TB is created with the available space displayed in the "Largest Free Space" field for the selected RAID group.

Caution

- When "Enable" is selected, the capacity and the unit are not available.
- The capacity for created ODX Buffer volume is not displayed. Use the [Volume] screen to check the volume capacity after volume creation is complete.

- Encryption by CM
  Select whether to encrypt (On) or not encrypt (Off) the new volumes.
  - When "On" is selected:
    A volume that is encrypted by CM is created.
  - When "Off" is selected:
    A volume that is not encrypted is created.

Caution

- When "Thin Provisioning" is selected for "Type", selecting on or off for "Encryption by CM" is not available.
- When "Encryption by CM" is "On", a RAID group that is configured with SEDs cannot be selected. When creating an ODX Buffer volume in a RAID group that is configured by SEDs, select "Off".
- When the encryption mode is disabled, "Encryption by CM" is not displayed.

● Target RAID Group/Thin Provisioning Pool

- When "Type" is "Standard"
  - Radio buttons to select a RAID group
    Select the RAID group in which the ODX Buffer volume is created.

Caution

- When "Encryption by CM" is "On", a RAID group that is configured with SEDs cannot be selected.
- RAID groups in the following conditions are not displayed in the target RAID group list:
  - RAID groups that are registered in TPPs
  - RAID groups that are registered in FTRPs
  - RAID groups that are registered as REC Disk Buffers
  - RAID groups in which 128 volumes are already created
  - RAID groups for which "Usage" is "Temporary"
  - RAID groups with free space that is less than 1GB

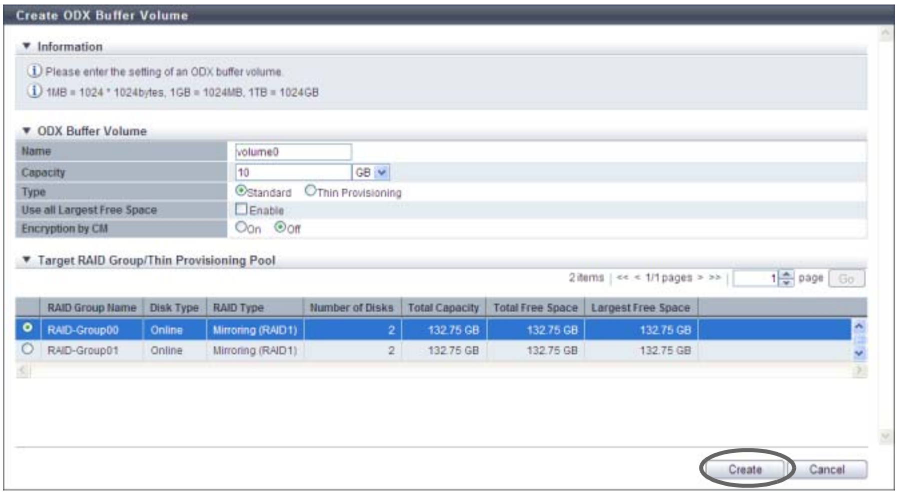
- When "Type" is "Thin Provisioning"
  - Radio buttons to select a TPP
    Select the TPP in which the ODX Buffer volume is created.

Caution

TPPs that are registered in FTRPs are not displayed in the target Thin Provisioning Pool list.

Note

When using the maximum free space in the RAID group to create an ODX Buffer volume without specifying the capacity, select the "Enable" checkbox for "Use all Largest Free Space". A "Standard" type volume can be created using the maximum free space.



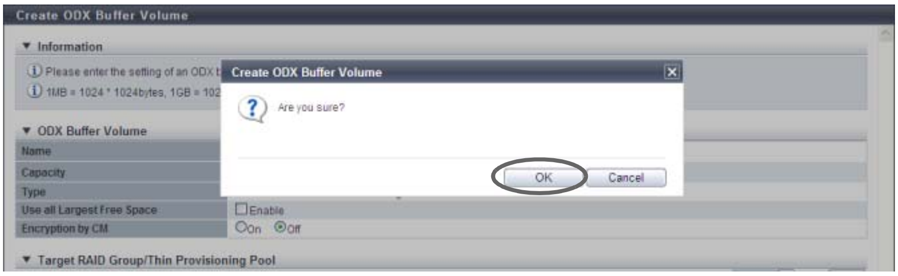
→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When the "Name" is not input
- When the name overlaps with an existing volume name for "Name"
- When the "Name" does not satisfy the input conditions
- When the "Enable" checkbox for "Use all Largest Free Space" is cleared and "Capacity" is not input
- When the "Enable" checkbox for "Use all Largest Free Space" is selected and the capacity of a created ODX Buffer volume is less than 1GB
- When the "Enable" checkbox for "Use all Largest Free Space" is selected and the capacity of a created ODX Buffer volume exceeds the maximum capacity
- When the capacity that is specified for "Capacity" exceeds the maximum capacity that can be created
- When the maximum number of volumes that can be created is exceeded
- When free space in the RAID group or TPP is insufficient
- LDE is being performed in the target RAID group

3 Click the [OK] button.



→ ODX Buffer volume creation starts.

4 Click the [Done] button to return to the [Setting] screen.

End of procedure

8.2.11 Modify Copy Parameters

This function sets the parameters to enable automatic reporting when the SDP capacity is insufficient during a SnapOPC+ session and specifies the unit of the area allocation to the SDV (SDPE). If the copy source data exceeds the physical capacity of copy destination (and when the free SDP does not exist), an error occurs in the relevant copy session and other older copy sessions. This function prevents stopping copy session when the capacity shortage occurs. There are three methods for notification; E-mail, SNMP Trap, and syslog. The ETERNUS DX Disk storage system reports the notification using the method specified in "11.2.9.1 Setup Event Notification" (page 880). When reporting, select the notification method in advance.

Caution

- Registering the license for the Advanced Copy feature is required to use SnapOPC+.
- Make sure to set the notification method by using the procedure in "11.2.9.1 Setup Event Notification" (page 880) to automatically report when the SDP usage exceeds the threshold.
- Notification of the shortage of SDP capacity is sent only once for each policy level. Even if the threshold is exceeded again within the 24 hours from the first notification, the ETERNUS DX Disk storage system does not report that effect. After 24 hours has passed, the ETERNUS DX Disk storage system sends a notification again.
- If the threshold for multiple policies is satisfied at the same time, the ETERNUS DX Disk storage system notifies of the highest policy level.

The procedure to modify copy parameters is as follows:

Procedure

1 Click [Modify Copy Parameters] in [Action].

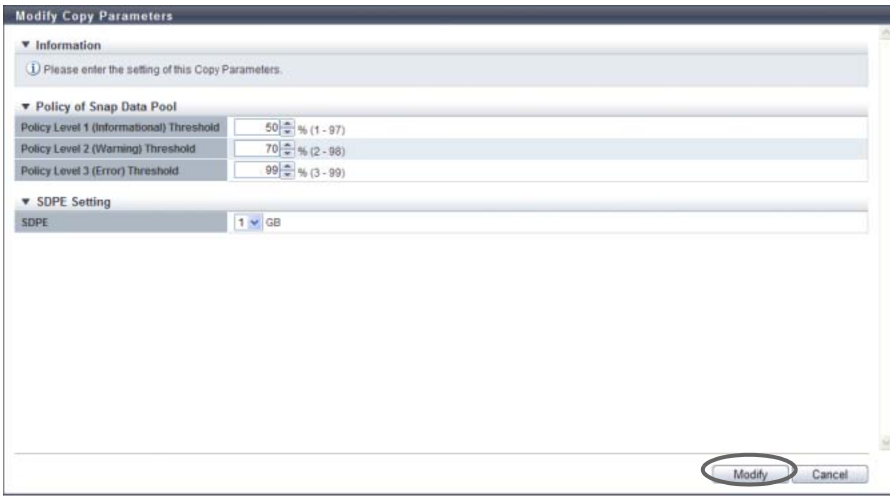
2 Specify the threshold for each policy level, and click the [Modify] button.

● Policy of Snap Data Pool

- Policy Level 1 (Informational) Threshold
  If the usage of SDP exceeds the specified threshold, the ETERNUS DX Disk storage system notifies that effect as the Policy Level 1 (Informational).
  Specify between 1% and 97% for the threshold.
- Policy Level 2 (Warning) Threshold
  If the usage of SDP exceeds the specified threshold, the ETERNUS DX Disk storage system notifies that effect as the Policy Level 2 (Warning).
  Specify between 2% and 98% for the threshold.
- Policy Level 3 (Error) Threshold
  If the usage of SDP exceeds the specified threshold, the ETERNUS DX Disk storage system notifies that effect as the Policy Level 3 (Error). Specify between 3% and 99% for the threshold.

● SDPE Setting

- SDPE
  Specify Snap Data Pool Element (SDPE), that is the unit of allocation to the SDV.
  - 1GB
  - 2GB
  - 4GB



→ A confirmation screen appears.

Caution

If the magnitude relation is not "Threshold for a policy level 1" → "Threshold for policy level 2" → "Threshold for policy level 3", an error screen appears.

3 Click the [OK] button.



→ The specified copy parameters are registered.

4 Click the [Done] button to return to the [Snap Data Pool] screen.

End of procedure

8.2.12 Set Copy Path

This function sets copy path information between the ETERNUS Disk storage systems required for performing REC using the wizard screen.
Copy path information indicates the path (copy path and the storage system where the copy path is set) used for performing REC.
Not only copy path information of the local device but also the information between remote devices can be created.
The following ETERNUS Disk storage systems support the [Set Copy Path] function.

- ETERNUS DX90 S2
- ETERNUS DX410 S2/DX440 S2
- ETERNUS DX8100 S2/DX8700 S2
- ETERNUS DX90
- ETERNUS DX410/DX440/DX8100/DX8400/DX8700
- ETERNUS4000/ETERNUS8000
- ETERNUS6000

In this section, the storage system that is used to create copy paths is referred to as "local device" and the storage system that is connected to is referred to as a "remote device".

The following settings are available for the [Set Copy Path] function:

(1) Register Device Information (Register)

(2) Create Copy Path (Create)

(3) Save (Save)

(4) Apply Copy Path (Apply)

(5) Measure Round Trip Time (Measure)

Caution

- To create copy path information between different models of ETERNUS Disk storage systems (such as ETERNUS DX440 S2 and ETERNUS4000), be sure to create the information on the newer model of ETERNUS Disk storage system (ETERNUS DX440 S2 in the above example). The copy path creating function on an older model may not have a function to add the device information for newer models or the created path information file cannot be applied to newer models.
- When creating the copy path information between ETERNUS DX S2 series (*1) with an old controller firmware version (V10L2x or earlier) and ETERNUS DX S2 series with a new controller firmware version (V10L3x or later), use the storage system with controller firmware version V10L3x or later (the new storage system) to create the copy path information. If the copy path information is created with an ETERNUS DX S2 series with controller firmware version V10L2x or earlier (an old storage system), a device information file that is created by a new storage system cannot be used for the old storage system. In this case, the device information of the new storage system must be specified manually.

*1: ETERNUS DX90 S2, ETERNUS DX410 S2/DX440 S2, or ETERNUS DX8100 S2/DX8700 S2

- To use an iSCSI port as the copy path, there are some restrictions for applying the copy path information files that are created by new storage systems or old storage systems. Refer to "Applying copy path information files with IPv6" (page 340) for details.
- When the controller firmware version V10L3x or later is used, the IP versions that can be used for an iSCSI port (except an iSCSI port for older storage system connection) are as follows; IPv4, IPv6 (Link Local), or IPv6 (Connect IP). A copy path can be created between iSCSI ports that are the same IP version.
- Copy paths cannot be created when the same ETERNUS Disk storage system is set for the local device and remote device.
- If the Box ID is changed after setting the copy path, REC will no longer run. Create copy paths again with the new Box ID, and then apply the new copy path information to all the related ETERNUS Disk storage systems again.
- Different types of interfaces (FC, iSCSI 1Gbit/s, iSCSI 10Gbit/s) cannot exist together on an REC path (connection between a local device and a remote device).
- Up to 16 remote devices can be connected from one storage system.
- Up to 8 copy paths can be created between a pair of storage systems.
- Up to 32 destination ports (FC-RA) can be connected from one port.
- Up to 16 destination ports (iSCSI-RA) can be connected from one port.
- If a copy path, which is being used in an REC, was modified, it may affect operations, such as the REC being stopped. Confirm that REC is not in use before modifying the information. To check whether REC is in use, refer to the copy session list of remote copy.
- Copy path information files cannot be applied to the storage system when the port mode of the port set in the copy path information does not match the port mode of the adapter installed in the storage system to be applied to. Modify the copy path information or switch the port mode on the storage system in advance. Refer to "9.2.3.11 Modify Port Mode" (page 571) for switching port modes.
- Copy path information files cannot be applied to the storage system when the port type (FC or iSCSI) that is specified in the copy path information does not match the port type of the adapter that is installed in the storage system. In addition, if the port type is iSCSI, a copy path information file cannot be applied to the storage system when the IP address and iSCSI name in the copy path information file do not match the specification of the adapter that is installed in the storage system.
- Before measuring the round trip time, set a physical path properly between the ETERNUS Disk storage systems. When a copy path has an error, the round trip time cannot be measured correctly.
- It takes a maximum of 160 seconds to measure the round trip time.

Note

- Only copy path information files created/saved with this function can be loaded with this function.
- The device information files that are exported/saved by the following storage systems can be loaded for this function:
  - ETERNUS DX90 S2
  - ETERNUS DX410 S2/DX440 S2
  - ETERNUS DX8100 S2/DX8700 S2
  - ETERNUS DX90
  - ETERNUS DX410/DX440
  - ETERNUS DX8100/DX8400/DX8700
  - ETERNUS4000
  - ETERNUS8000
  - ETERNUS6000
- Use the procedure in "8.2.13 Delete All Copy Path" (page 343) to delete the copy path information in the local device. The copy path information of the local device is initialized.
- The round trip time can be measured only between the local device and a remote device that has a physical path to the local device. When a copy path is created between remote devices, apply a copy path information file to the applicable device before measuring the round trip time.
- The round trip time can be measured only when the connection type is "Remote".
- To change the measured round trip time, refer to "8.2.17 Measure Round Trip Time" (page 349).
- To change the link speed, create a copy path with a new link speed by using this function, and apply the created copy path to the related storage systems.

The procedure to set an REC copy path is as follows:

Operation Mode Selection

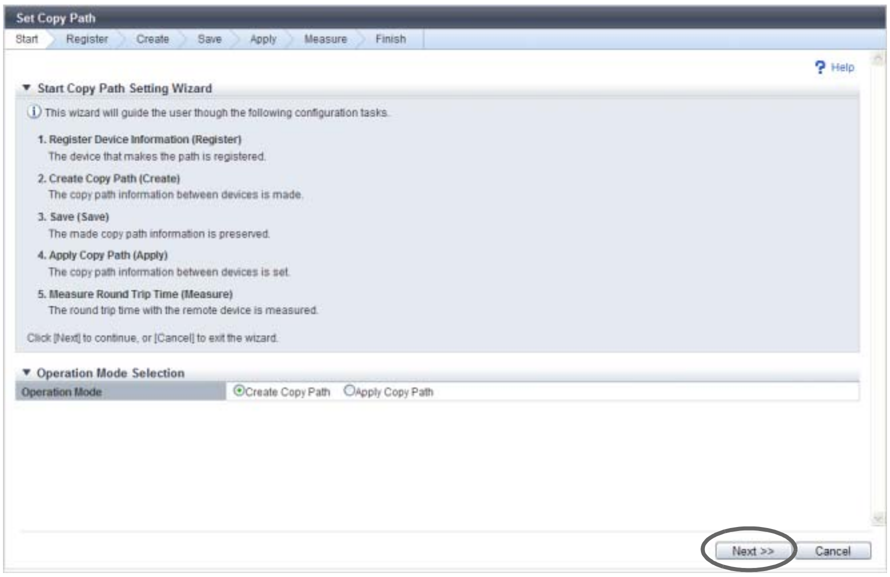
In this screen, select the operation mode.

Procedure

1. Click [Set Copy Path] in [Action].

2 Select the operation mode, and click the [Next >>] button.

- Operation Mode
  - Create Copy Path
    Create a copy path and apply to the ETERNUS DX Disk storage system.
  - Apply Copy Path
    Apply the existing copy path information file to the ETERNUS DX Disk storage system.



The displayed screen is different depending on the selected operation.

■ When selecting "Create Copy Path"

The [Base Information Selection] screen appears. Proceed to "Register Device Information" (page 322).

■ When selecting "Apply Copy Path"

The [Copy Path Information File Selection] screen appears. Proceed to "Copy Path Information File Selection" (page 336).

End of procedure

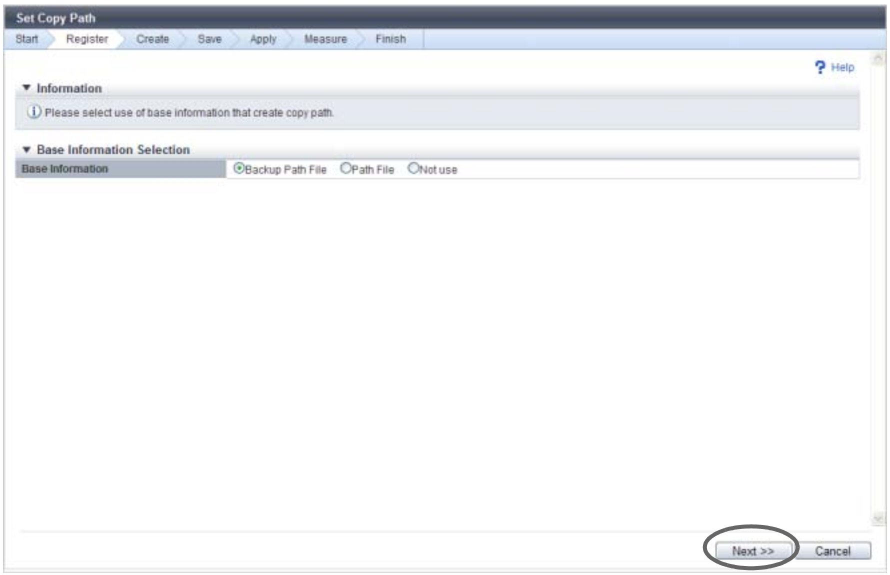
Register Device Information

In this screen, register the device information to which the copy path is created.

Procedure

1 Select a device information selection method in the [Base Information Selection] screen, and click the [Next >>] button.

- Base Information
  - Backup Path File
    The copy path information file previously applied is used.
  - Path File
    The copy path information file stored in the ETERNUS DX Disk storage system is used.
  - Not use
    Copy path is created manually.



The displayed screen is different depending on the selected item.

■ When selecting "Backup Path File"

→ The [Check Registered Device Information] screen appears. Proceed to Step 3.

■ When selecting "Path File"

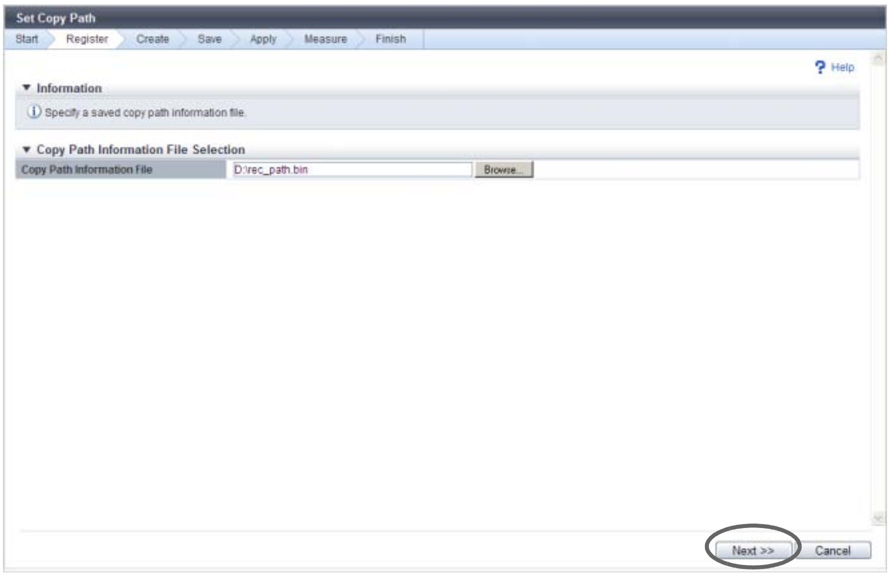
→ The [Copy Path Information File Selection] screen appears. Proceed to Step 2.

■ When selecting "Not use"

→ The [Device Information File Selection] screen appears. Proceed to Step 7.

2 Input the location where the copy path information file that to be used, and click the [Next >>] button.

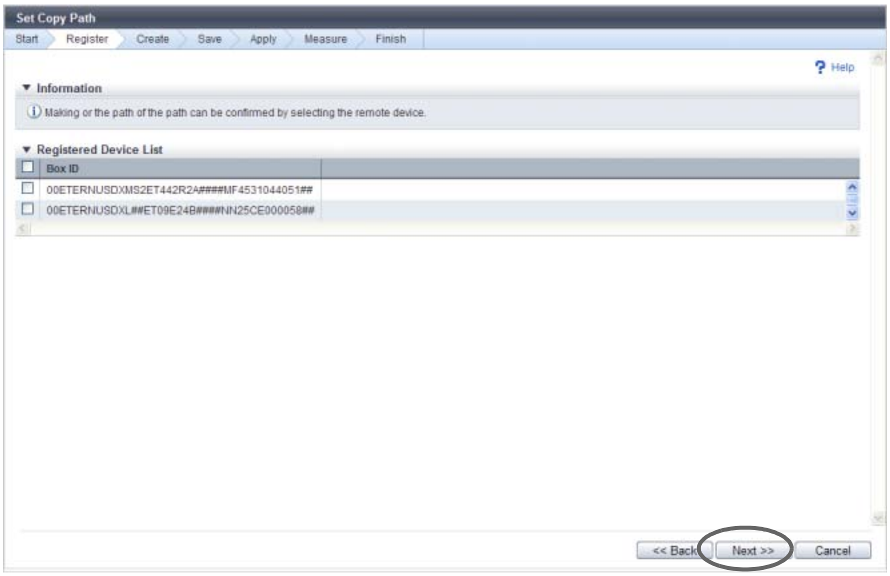
- Copy Path Information File
  Input the location where the copy path information file that to be used.
  Click the [Browse...] button to specify the location, or input the location directly.



→ The [Check Registered Device Information] screen appears.

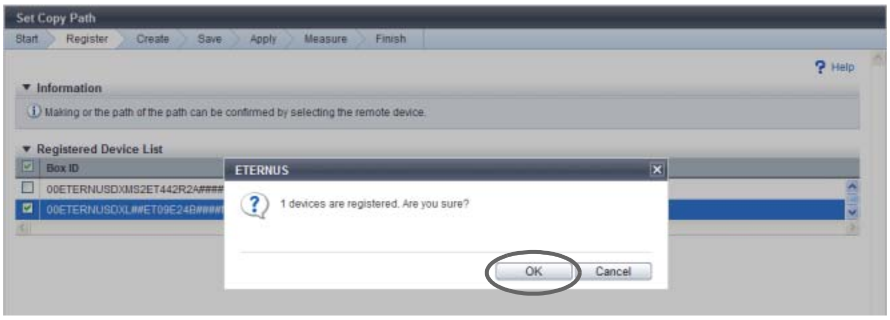
3 Select a device to register the information (multiple selections can be made), and click the [Next >>] button.

- Checkboxes for selecting a device
  A list of the ETERNUS Disk storage system information specified in the copy path information file previously applied or stored in the ETERNUS DX Disk storage system is displayed.
  Select the storage system to create a copy path.



→ A confirmation screen appears.

4 Click the [OK] button.



→ The [Device Configuration Setting] screen appears.

Note

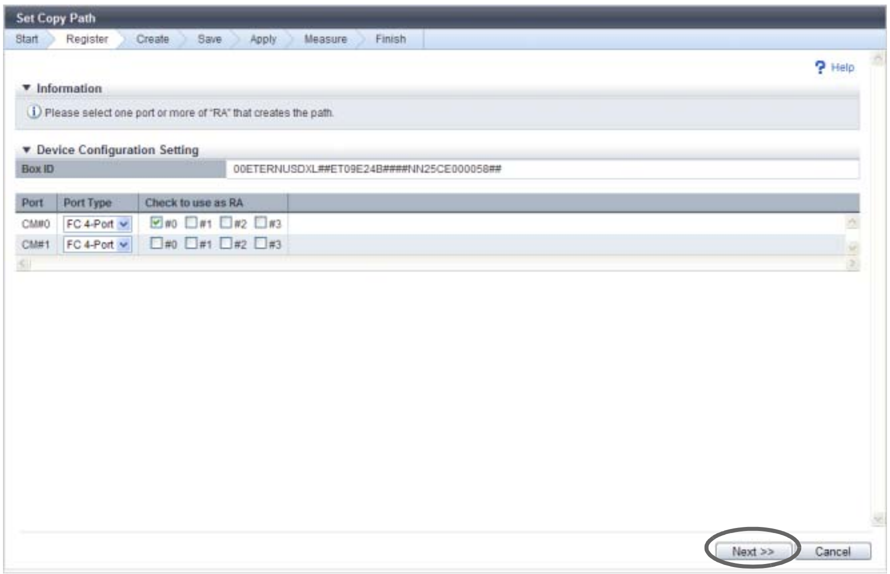
When no storage system to register the information is selected, the [Device Information File Selection] screen appears. Proceed to Step 7.

5 Set the port to be used for the copy path, and click the [Next >>] button.

- Port Type
  Select the port type to set a copy path. The displayed contents vary depending on the device type.
  - For ETERNUS DX90 S2
    FC 1-Port, FC 2-Port, iSCSI 1-Port, iSCSI 2-Port, iSCSI-RA (*1)
  - For ETERNUS DX410 S2/DX440 S2
    FC 2-Port, FC 4-Port, iSCSI 2-Port, iSCSI-RA (*1)
  - For ETERNUS DX8100 S2/DX8700 S2
    FC 2-Port, FC 4-Port, iSCSI 2-Port, iSCSI-RA (*1)
  - For ETERNUS DX90
    FC 4-Port
  - For ETERNUS DX410/DX440/DX8100/DX8400/DX8700 or ETERNUS4000/ETERNUS8000
    FC 1-Port, FC 2-Port, FC 4-Port, iSCSI-RA 1-Port, iSCSI-RA 2-Port
  - For ETERNUS6000
    FC 2-Port, FC 4-Port

  *1: iSCSI-RA is a dedicated adapter that is used for REC between the local device and the ETERNUS DX400 series, the ETERNUS DX8000 series, the ETERNUS4000, or the ETERNUS8000.
- Check to use as RA (for an ETERNUS Disk storage system that is not the ETERNUS6000)
  Select the port to set a copy path as RA.
  The port number is displayed at right side of the checkbox. When "iSCSI-RA", "iSCSI-RA 1-Port", or "iSCSI-RA 2-Port" is selected in the "Port Type" field, all ports are automatically selected.
  - #x (x: Port number (0 - 3))
  - When "FC 1-Port" is selected in the "Port Type" field: #0 (#1, #2 and #3 cannot be selected.)
  - When "FC 2-Port" is selected in the "Port Type" field: #0, #1 (#2 and #3 cannot be selected.)
  - When "FC 4-Port" is selected in the "Port Type" field: #0, #1, #2, #3
  - When "iSCSI 1-Port" is selected in the "Port Type" field: #0 (#1 cannot be selected.)
  - When "iSCSI 2-Port" is selected in the "Port Type" field: #0, #1
  - When "iSCSI-RA" is selected in the "Port Type" field: #0, #1 (All ports are selected.)
  - When "iSCSI-RA 1-Port" is selected in the "Port Type" field: #0 (#0 is selected.)
  - When "iSCSI-RA 2-Port" is selected in the "Port Type" field: #0, #1 (All ports are selected.)

- Initiator / Target Setting
  Select the port mode to set a copy path as RA.
  - Initiator
  - Target



The displayed screen is different depending on the port settings.

■ When "FC 1-Port", "FC 2-Port", or "FC 4-Port" is selected in the "Port Type" field

- When a device for which port setting is not completed exists
  → The [Device Configuration Setting] screen appears again. Proceed to Step 5.
- When port setting is completed for all the selected devices
  → The [Device Information File Selection] screen appears. Proceed to Step 7.

■ When "iSCSI-RA", "iSCSI-RA 1-Port", or "iSCSI-RA 2-Port" is selected in the "Port Type" field

→ The [iSCSI Port Information Setting] screen appears. Proceed to Step 6.

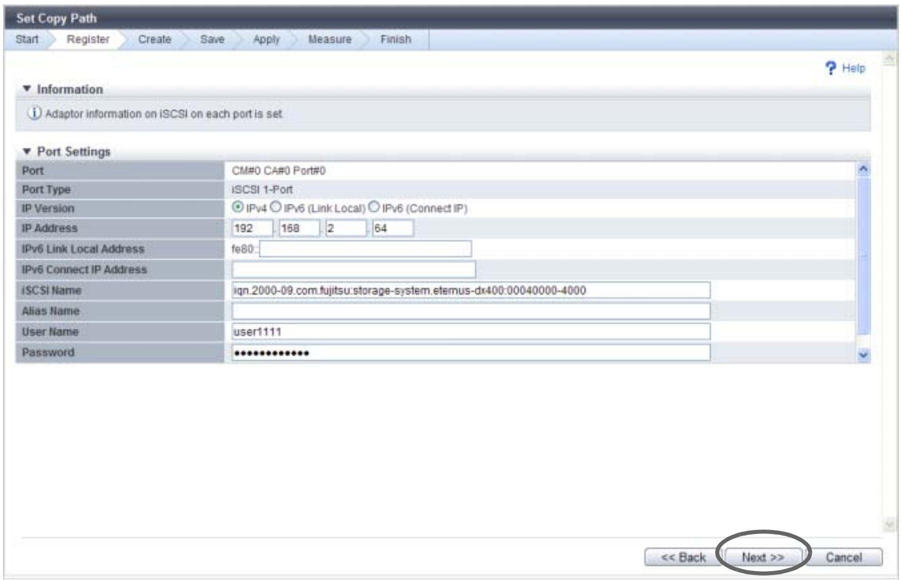
■ When "iSCSI 1-Port" or "iSCSI 2-Port" is selected in the "Port Type" field and one or more ports used as "RA" exist

→ The [iSCSI Port Information Setting] screen appears. Proceed to Step 6.

6 Set the iSCSI port in the [iSCSI Port Information Setting] screen, and click the [Next >>] button.

- IP Version
  Select the IP version of the port to set a copy path.
  If the copy path is already specified for the port when the copy path information file is being loaded, the IP version that is set for the port is selected as the default setting. For other ports, "IPv4" is set as the default setting.
  This item is not displayed when "Port Type" is "iSCSI-RA" (for older storage system connection), "iSCSI-RA 1-Port", or "iSCSI-RA 2-Port".
  - IPv4
  - IPv6 (Link Local)
  - IPv6 (Connect IP)
- IP Address
  Input the IP address of the iSCSI port.
  This item is required when "Port Type" is "iSCSI-RA" (for older storage system connection), "iSCSI-RA 1-Port", or "iSCSI-RA 2-Port" or when "IP Version" is "IPv4". If not specified, the field is blank.
  The following input conditions apply:
  - Numeric characters
  - First text box: "1" - "255"
  - Other text boxes: "0" - "255"
- IPv6 Link Local Address
  Input the IPv6 link IP address of the iSCSI port.
  This item is required when "IP Version" is "IPv6 (Link Local)".
  Refer to "Available IPv6 Address" (page 757) for details. Note that the current setting is displayed by an abbreviation.
  This item is not displayed when "Port Type" is "iSCSI-RA" (for older storage system connection), "iSCSI-RA 1-Port", or "iSCSI-RA 2-Port". If not specified, the field is blank.
  The following input condition applies:
  - fe80::xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
    Refer to "IPv6 Address Notation" (page 378) for details.
- IPv6 Connect IP Address
  Input the IPv6 connect IP address of the iSCSI port.
  This item is required when "IP Version" is "IPv6 (Connect IP)".
  The following IPv6 addresses can be used; "global address", "unique local address", and "6to4 address". Refer to "Available IPv6 Address" (page 757) for details. Note that the current setting is displayed by an abbreviation.
  This item is not displayed when "Port Type" is "iSCSI-RA" (for older storage system connection), "iSCSI-RA 1-Port", or "iSCSI-RA 2-Port". If not specified, the field is blank.
  The following input condition applies:
  - xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
    Refer to "IPv6 Address Notation" (page 378) for details.

- iSCSI Name
  Specify the iSCSI name of the iSCSI port (required). If not specified, the field is blank. Specify a unique iSCSI name in the same device.
  The following input conditions apply:
  - Alphabetic characters (lower case) and numeric characters
  - Symbols "-" (hyphen), "." (period) and ":" (colon)
  - The name starts with "iqn." or "eui."
  - 4 - 223 characters
- Alias Name
  Specify the Alias Name of the iSCSI port (can be omitted). If not specified, the field is blank.
  The following input condition applies:
  - Up to 31 alphanumeric characters
- User Name
  Specify the user name to access the iSCSI port (can be omitted). After specifying the user name, specify the "Password". If not specified, the field is blank.
  The following input condition applies:
  - Up to 255 alphanumeric characters and symbols
- Password
  Specify the password to access the iSCSI port (can be omitted). This item is required when setting the "User Name". The entry is displayed with "*" or similar characters. If not specified, the field is blank.
  The following input condition applies:
  - 12 - 100 alphanumeric characters and symbols



The displayed screen is different depending on the port setting status.

■ When a device for which port setting is not completed exists

→ The [Device Configuration Setting] screen appears again. Proceed to Step 5.

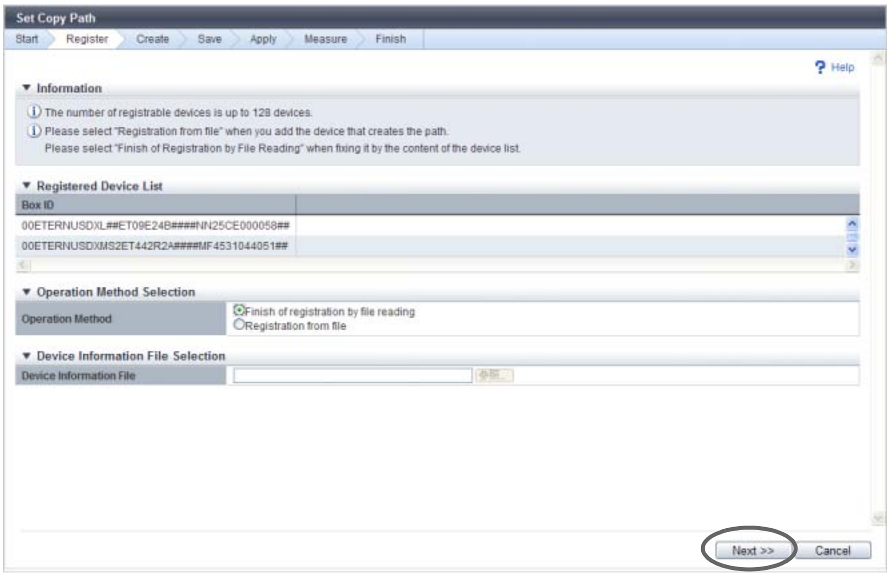
■ When port setting is completed for all the selected devices

→ The [Device Information File Selection] screen appears. Proceed to Step 7.

7 Specify whether to use the device information file, and click the [Next >>] button.

- Operation Method Selection
  - Operation Method
    Select whether to continue the device registration.
    - Finish of Registration by File Reading
    - Registration from File
      When selecting "Registration from file", specify a file in the "Device Information File Selection" field. When 128 devices are already registered, "Registration from file" cannot be selected.

- Device Information File Selection
  - Device Information File
    Input the location where the device information file is stored.
    Click the [Browse...] button and specify the location, or directly input the path.



The displayed screen is different depending on the port setting status.

■ When selecting "Registration from File"

→ The [Device Configuration Setting] screen appears. Proceed to Step 5.

■ When selecting "Finish of Registration by File Reading"

→ The [Device Information File Selection] screen appears. Proceed to Step 8.

8 Select whether to continue registration of device information, and click the [Next >>] button.

- Operation Method Selection

- Operation Method
  Select whether to continue the device registration.
  - Registration by manual operation
    When selecting "Registration by manual operation", specify parameters in the "Device Information Setting" field.
    When 128 devices are already registered, "Registration by manual operation" cannot be selected.
  - Finish of Registration by File Reading

- Device Information Setting

- Device Type
  Select the device type that is to be registered.
  - ETERNUS DX8700 S2
  - ETERNUS DX8100 S2
  - ETERNUS DX90 S2
  - ETERNUS DX410 S2/DX440 S2
  - ETERNUS DX90
  - ETERNUS DX410/DX440/DX8100/DX8400/DX8700
  - ETERNUS4000/ETERNUS8000 MODEL400/600/800/1200/2200
  - ETERNUS4000/ETERNUS8000 MODEL300/500/700/900/1100/2100
  - ETERNUS6000

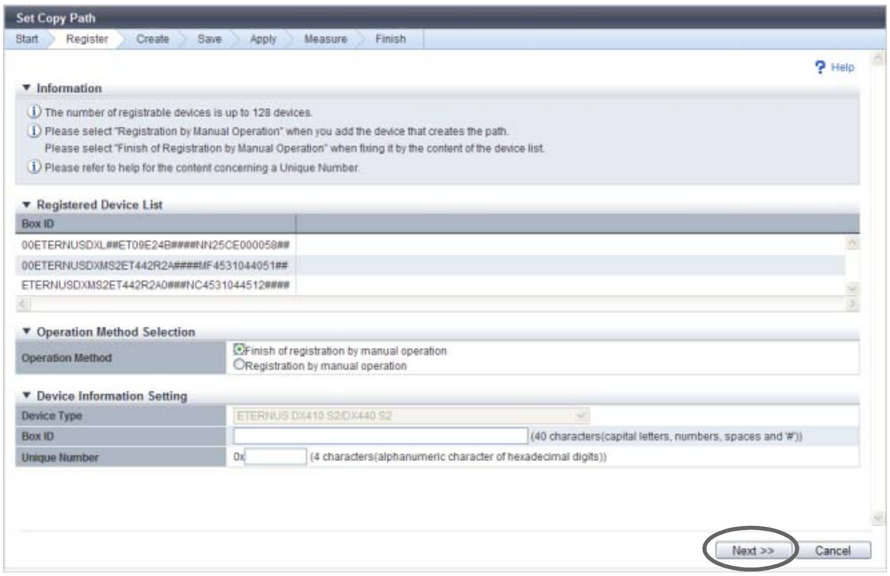
- Box ID
  Input the Box ID of the storage system that is to be registered.
  Box ID that is already registered in the ETERNUS Disk storage system cannot be specified.
  The following input conditions apply:
  - Alphabetic characters (upper case), numeric characters, spaces, and "#" (hash key characters)
  - 40 characters (fixed)

Caution

In the following conditions, check the Box ID for the relevant storage system from the [System Settings] screen in the [System] navigation. Refer to "11.2.13.3 Change Box ID" (page 933) for details.

- ETERNUS DX90 S2 (V10L30 or later)
- ETERNUS DX410 S2/DX440 S2 (V10L30 or later)
- ETERNUS DX8100 S2/DX8700 S2 (V10L30 or later)

- Unique Number
  Input the unique number of the device to be registered.
  Input conditions vary depending on the device type.
  Unique number that is already registered in another ETERNUS Disk storage system cannot be specified.
  The following input conditions apply:
  - For all device types:
    4-digit hexadecimal (fixed)
  - ETERNUS DX90 S2:
    Input the value of the fifth and sixth bytes of the WWN.
    [Example] For WWN 500000E0D4445800: [4458]
  - ETERNUS DX410 S2/DX440 S2:
    Input the value of the fifth and sixth bytes of the WWN.
    [Example] For WWN 500000E0D404C500: [04C5]
  - ETERNUS DX8100 S2:
    Input the value of the fifth and sixth bytes of the WWN.
    [Example] For WWN 500000E0D42F1000: [2F10]
  - ETERNUS DX8700 S2:
    Input the value of the fifth and sixth bytes of the WWN.
    [Example] For WWN 500000E0D4314E00: [314E]
  - ETERNUS DX90:
    Input the value of the fifth and sixth bytes of the WWN.
    [Example] For WWN 500000E0D062A100: [62A1]
  - ETERNUS DX410/DX440/DX8100/DX8400/DX8700 or ETERNUS4000/ETERNUS8000:
    Input the value of the sixth and seventh bytes of the WWN.
    [Example] For WWN 2000000B5D6A1234: [1234]
  - ETERNUS6000:
    Input the value of the sixth and seventh bytes of the WWN.
    [Example] For WWN 2000000E00CB5678: [5678]



Note

- The unique number can be checked by the WWN of the FC port. All of the FC ports in a storage system have the same unique number. The displayed screens for each storage system model are as follows:
  - For ETERNUS DX90 S2, ETERNUS DX410 S2/DX440 S2, or ETERNUS DX8100 S2/DX8700 S2:
    → Port information (FC) of the [Channel Adapter Detail] screen
  - For ETERNUS DX90:
    → Port status (FC) of the [Storage System Status] screen
  - For ETERNUS DX410/DX440, ETERNUS DX8100/DX8400/DX8700, or ETERNUS4000/ETERNUS8000:
    → CA Detailed Information screen (FC) of the [Device Status] screen
  - For ETERNUS6000:
    → WWN list (FC) of the [Device Status] screen
- If only iSCSI ports are installed in a storage system, the unique number can be checked by the default iSCSI name. All of the iSCSI ports in a storage system have the same unique number. For "iSCSI 1-Port" or "iSCSI 2-Port", the last four digits of the iSCSI name indicate the unique number.
  [Example]
  For the default iSCSI Name iqn.2000-09. com.fujitsu:storage-system.eternus-dx400:00044205: [4205].
  Note that the iSCSI name is a parameter that can be customized. It is not possible to check whether the iSCSI name is customized or not. In this case, create an REC device information file using the [Export Storage Information] function and register the device by file reading.

The displayed screen is different depending on the port setting status.

■ When selecting "Registration by manual operation"

→ The [Device Configuration Setting] screen appears again. Proceed to Step 5.

■ When selecting "Finish of Registration by File Reading"

→ The [Check Registered Device Information] screen appears. Proceed to Step 9.

9 Check the device information, and click the [Next >>] button.

→ The [Copy Path Creation Device Selection] screen appears. Proceed to "Set Copy Path" (page 332).

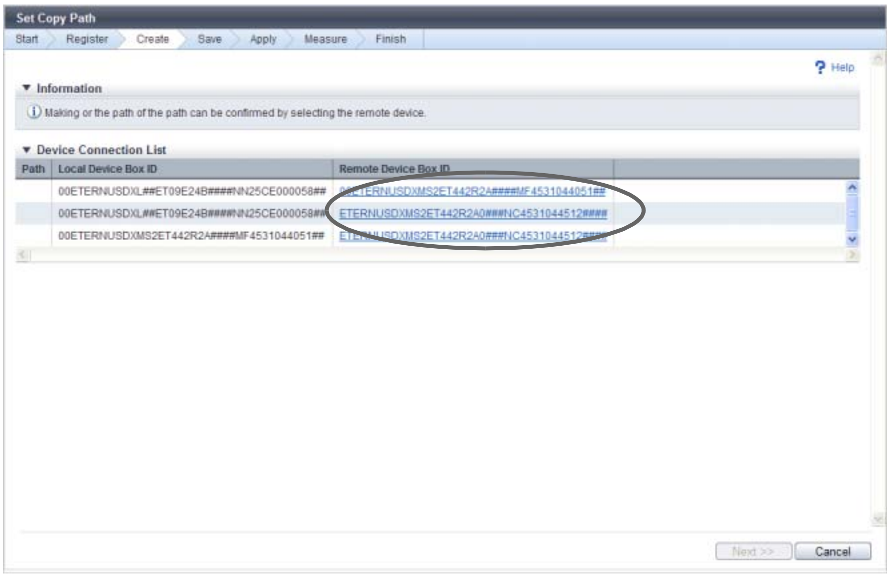
End of procedure

Set Copy Path

In this screen, set a copy path. Specify the Box ID of the target device in which the copy path is created, and set the line information between devices.

Procedure

1 Click the [Remote Device Box ID] link to create a copy path.



→ The [Copy Path Setting] dialog box appears.

2 Set a copy path in the [Copy Path Setting] dialog box and click the [OK] button.

- Copy Path Setting

  - Line Setting
    Select a copy path. Up to eight copy paths can be selected.
    Checkboxes are displayed only for the combinations meeting all the following conditions (combinations to which a copy path can be set):
    - The same port type (FC, iSCSI, or iSCSI-RA) is used for both the local device and remote device.
    - The same IP version (v4, v6L, or v6C) is specified for the iSCSI ports that are used for both the local and remote devices.
    - RA port is used.
    - For ETERNUS6000, the local device and the remote device have different port usages (Initiator/Target).

Line Setting

- Connection Type
  Select the connection type for the remote device.
  - Remote
    Connecting the local and remote devices via a line.
  - Direct
    Connecting the local and remote devices without a line.
    Even in connection via a switch, select "Direct" when not using a line.
- Link Speed
  Specify the link speed (*1) for connection with the remote device. This item can be set when the "Connection Type" is "Remote".
  The following input conditions apply:
  - Up to 5-digit decimal number
  - 1- 65535 (Mbit/s)

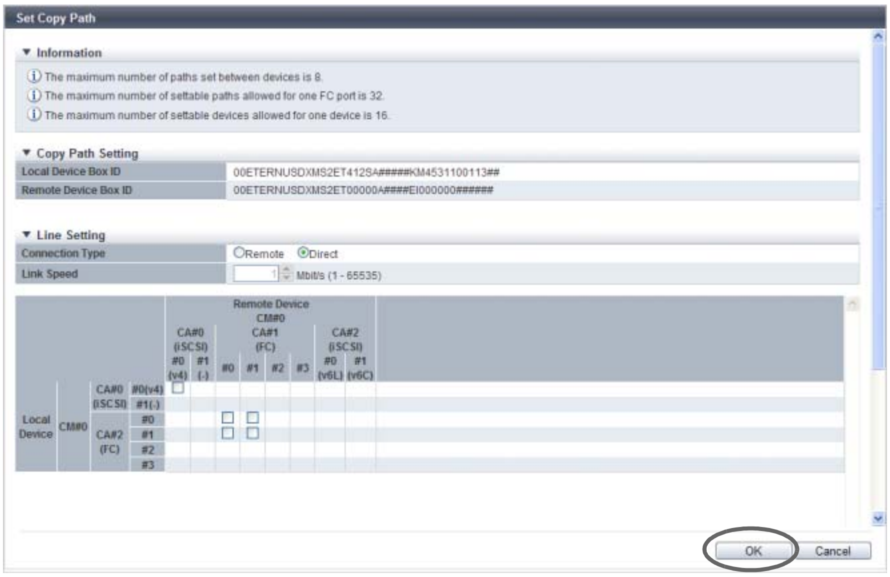
Caution

To change the link speed, create a copy path with a new link speed by using this function, and apply the created copy path to the related storage systems.

*1: For the "Link Speed" field, specify the WAN bandwidth (a total of multiple lines, if used) that can be actually used for REC. For some cases such as using the bandwidth control device, the WAN bandwidth that can be used for REC is designated. In this case, specify the designated value. In the ETERNUS Disk storage systems, the WAN bandwidth control is unavailable. To control WAN bandwidth, using the bandwidth control device is required.
When using a line device with the compression function, specify the bandwidth (a total of multiple lines, if used) that can be used after compression. In the ETERNUS Disk storage systems, data compression is unavailable. To compress data, using a line device with the compression function is required.
Example 1: When the bandwidth control device is not used
Line bandwidth (*2): 200Mbit/s (All available for REC)
The number of lines (*3): 4 (200Mbit/s for all)
Link speed = 200 (Mbit/s) x 4 = 800 (Mbit/s)
Example 2: When the bandwidth control device is used
Line bandwidth with bandwidth limit (*2): 100Mbit/s
(100Mbit/s out of 200Mbit/s line bandwidth is available for REC)
The number of lines (*3): 2 (100Mbit/s for all)
Link speed = 100 (Mbit/s) x 2 = 200 (Mbit/s)
Example 3: When the line device has no compression function
Line bandwidth (*2): 200Mbit/s (All available for REC)
The number of lines (*3): 2 (200Mbit/s for all)
Compression ratio: 0 (%) (No compression)
Link speed = 200 (Mbit/s) x 2 / (1 - 0 (%)) = 400 (Mbit/s)
Example 4: When the line device has the compression function
Line bandwidth (*2): 200Mbit/s (All available for REC)
The number of lines (*3): 2 (200Mbit/s for all)
Compression ratio: 20 (%) (20% for all)
Link speed = 200 (Mbit/s) x 2 / (1 - 20 (%)) = 500 (Mbit/s)

*2: The line bandwidth that the user has signed up to be used for REC

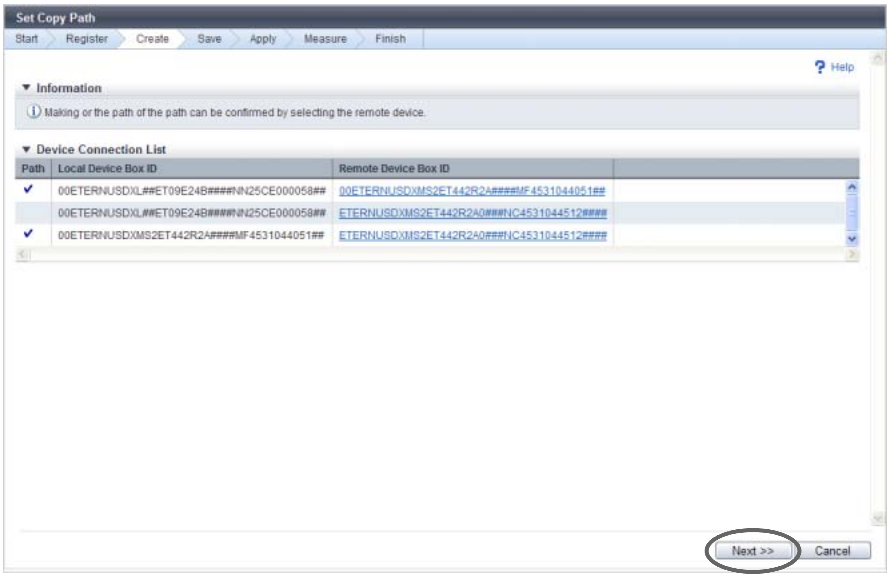
*3: The number of lines that the user has signed up to be used for REC



→ The [Copy Path Creation Device Selection] screen appears.

3 Repeat Step 1 and Step 2 the same number of times as the number of storage systems to set copy paths.

4 When setting a copy path is completed for all the storage systems, click the [Next >>] button.



→ The [Download File] screen appears. Proceed to "Save Copy Path" (page 335).

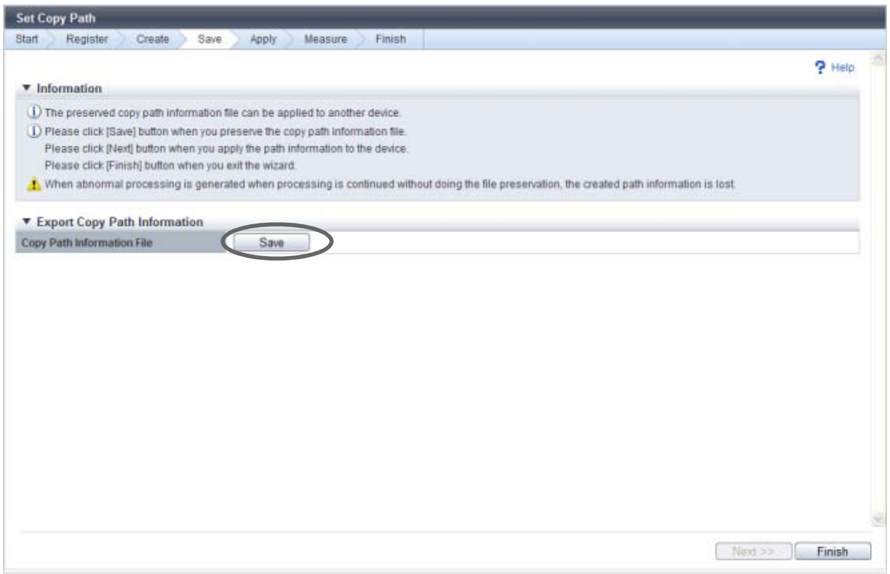
End of procedure

Save Copy Path

In this screen, save the copy path information that is created in the procedure in "Set Copy Path" (page 332).

Procedure

1 Click the [Save] button to save the copy path information.

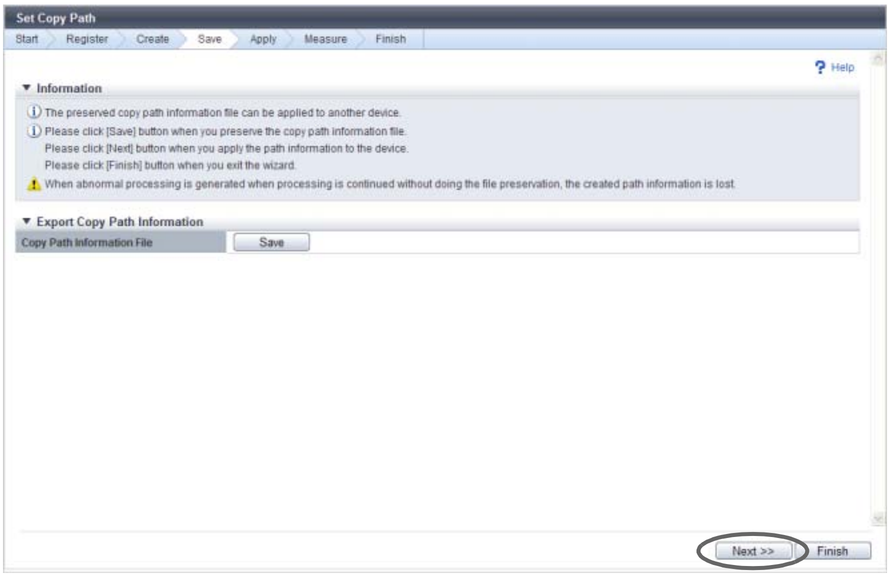


→ A dialog box to download the file appears.

2 Save the copy path information file.

The default file name is "RecPath_serial number for the ETERNUS DX Disk storage system_YYYY-MM-DD_hh-mm-ss.bin". (YYYY-MM-DD_hh-mm-ss: the date and time when the save screen (Step 1) is displayed.)

3 Click the [Next >>] button.



→ The [Device Connection List] screen appears. Proceed to "Apply Copy Path Information" (page 337).

Note

Clicking the [Done] button displays the [Finish Copy Path Setting Wizard] screen. Click the [OK] button to finish the [Set Copy Path] function.

End of procedure

Copy Path Information File Selection

In this screen, select the copy path information file to be used.

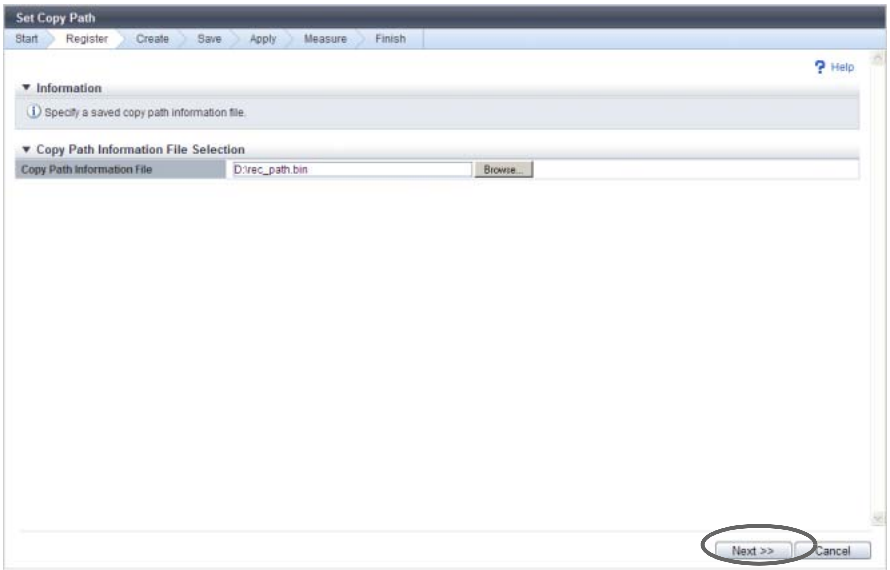
Note

Perform this procedure only when "Apply Copy Path" is selected in the procedure in "Operation Method Selection" (page 329).

Procedure

1 Input the location where the copy path information file to be used is stored, and click the [Next >>] button.

- Copy Path Information File
  Input the location where the copy path information file is stored.
  Click the [Browse...] button and specify the location, or directly input the path.



→ The [Device Connection List] screen appears. Proceed to "Apply Copy Path Information" (page 337).

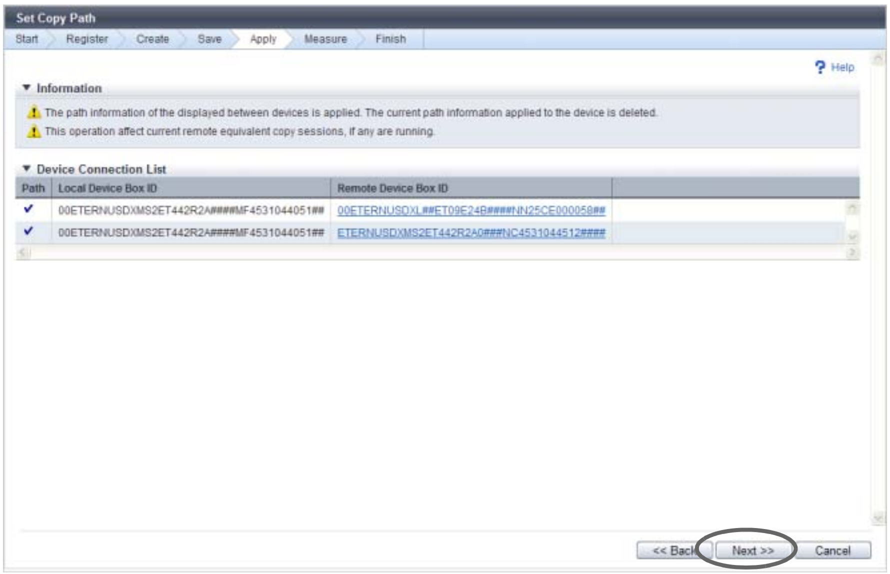
End of procedure

Apply Copy Path Information

In this screen, apply the copy path information.

Procedure

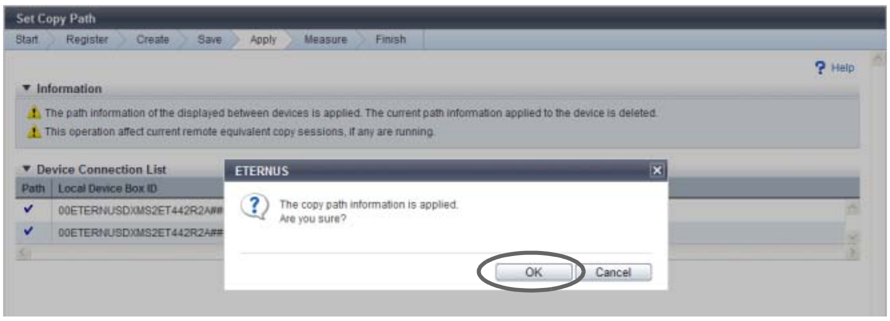
1 Confirm that the copy path is set between the devices in the [Device Connection List] screen, and click the [Next >>] button.



→ A confirmation screen appears.

> **Note**
>
> Click the Box ID of the remote device to display the [Check Copy Path Information Setting] dialog box where you can check the details of copy path information.

2 Click the [OK] button.



→ Application of the copy path information starts. After application completes, the [Measure Round Trip Time] screen appears. Proceed to "Measure Round Trip Time" (page 338).

Caution

- If the port mode does not match between the device configuration and the applied copy path information file configuration ("CA" in the storage system and "RA" in the copy path information file), an error screen appears.
- The [Finish Copy Path Setting Wizard] screen appears in the following conditions. Click the [Done] button to return to the [Copy Path] screen.
  - No remote device with a copy path to the local device
  - The connection type for all the remote devices is "Direct"

End of procedure

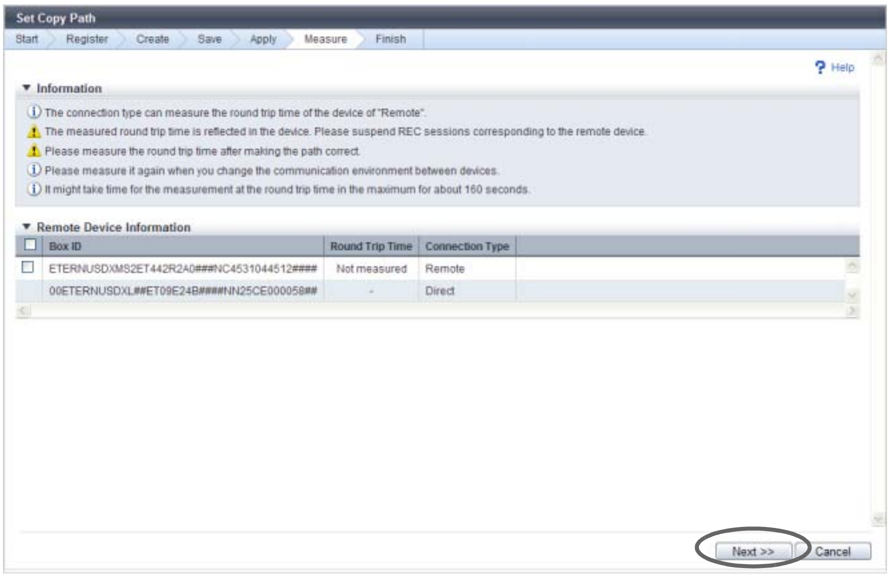
Measure Round Trip Time

In this screen, measure the round trip time between the local and remote devices.

Procedure

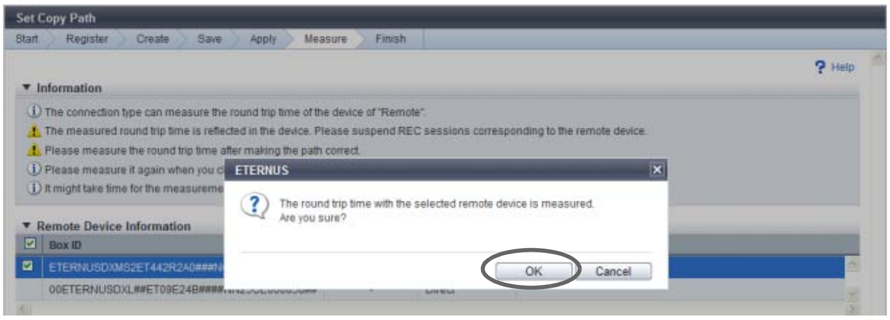
1 Select a remote device to measure the round trip time in the [Measure Round Trip Time] screen (multiple selections can be made), and click the [Next >>] button.

- Checkboxes for selecting a remote device
  Checkboxes are displayed only for a remote device with a copy path to the local device with a "remote" type connection. Select the remote device to measure the round trip time.



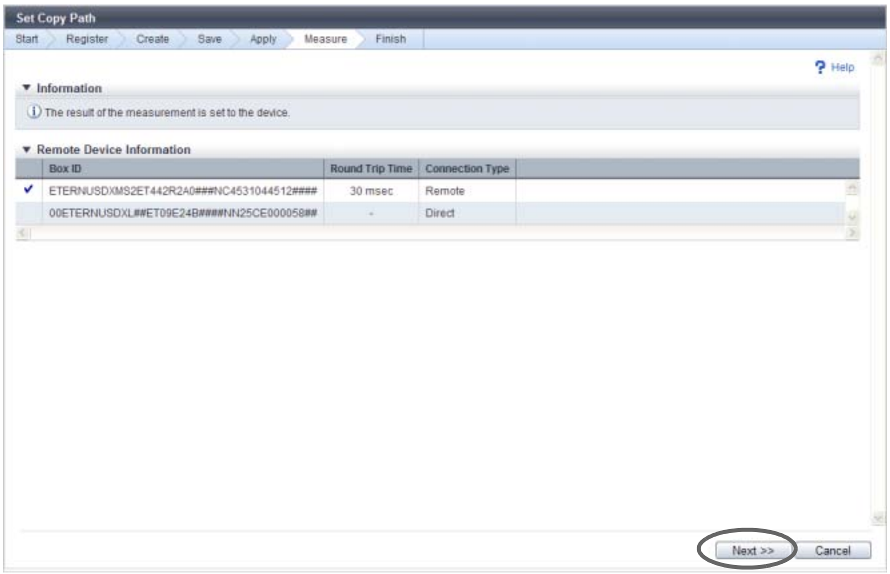
→ A confirmation screen appears.

2 Click the [OK] button.



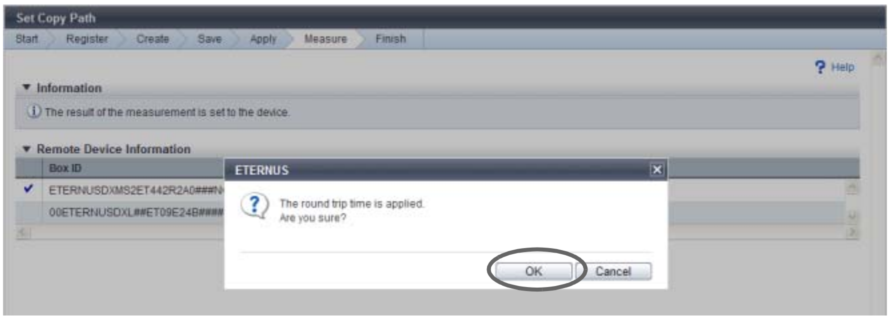
→ Measurement of the round trip time starts. After measurement completes, the [Measure Round Trip Time Result] screen appears.

3 Check the measured round trip time, and click the [Next >>] button.



→ A confirmation screen appears.

4 Click the [OK] button.



→ Setting the round trip time starts.

5 After setting the time, click the [Done] button to return to the [Copy Path] screen.

End of procedure

Applying copy path information files with IPv6

The following storage systems and copy path information files are used in this example.

Storage system	Target model	Current controller firmware version	Exported copy path information file
New storage systems	ETERNUS DX90 S2 ETERNUS DX410 S2/ DX440 S2 ETERNUS DX8100 S2/ DX8700 S2	V10L3x or later (IPv6 support)	New file (IPv4, IPv6 (Link Local), or IPv6 (Connect IP) can be used for the iSCSI-RA port)
Old storage systems	ETERNUS DX90 S2 ETERNUS DX410 S2/ DX440 S2 ETERNUS DX8100 S2/ DX8700 S2	V10L2x or earlier (IPv6 not supported)	Old file (only IPv4 can be used for the iSCSI-RA port)
Old storage systems (other models)	ETERNUS DX90 ETERNUS DX410/DX440 ETERNUS DX8100/ DX8700 ETERNUS4000/ ETERNUS8000 ETERNUS6000	Any firmware version (IPv6 not supported)	N/A (When creating copy paths between new storage systems and old storage systems or between new storage systems and old storage systems (other models), make sure to create a copy path information file using the new ETERNUS Disk storage system. In this case, creating copy path information files by using the old storage system (other models) is not available.)

The following table shows whether an exported device information file from each storage system can be loaded when creating a copy path information file.

Copy path information file		The storage system from which the device information file is downloaded		
Name	The storage system to which the file is created	Old storage systems (other models)	Old storage systems	New storage systems
Old file	Old storage systems	N/A	Available	N/A
New file (IPv6 address (*1) is not included)	New storage systems	Available	Available	Available
New file (IPv6 address (*1) is included)	New storage systems	Available	Available	Available

Available: The device information file can be loaded
N/A: The device information file cannot be loaded (manual input of the device information is required)

Applying copy path information files

- Obtain the copy path information file from the storage system to which the copy path is to be created and apply this file to the old storage systems (other models), the old storage systems, and the new storage systems

Copy path information file		The storage system to which the file is applied		
Name	The storage system to which the file is created	Old storage systems (other models)	Old storage systems	New storage systems
Old file	Old storage systems	Available (*2)	Available (*2)	Available (*4)
New file (IPv6 address (*1) is not included)	New storage systems	Available (*2)	Available (*4)	Available (*4)
New file (IPv6 address (*1) is included)	New storage systems	Available (*3)	Available (*3)	Available (*5)

Available: The copy path information file can be applied

*1: IPv6 (Link Local) and/or IPv6 (Connect IP)
*2: Only an IPv4 address is used for the copy path information file
*3: Only an IPv4 path can be used for the copy path information file
*4: Regarded as an IPv4 address is used for the copy path information file
*5: The copy path information file of the target storage system includes IPv6 paths

- Obtain the copy path information file from the storage system to which the copy path information file was applied

Copy path information file		The storage system from which the file is obtained		
Name	The storage system to which the file is created	Old storage systems (other models)	Old storage systems	New storage systems
Old file	Old storage systems	Available (*2)	Available (*2)	Available (*3)
New file (IPv6 address (*1) is not included)	New storage systems	Available (*2)	Available (*3)	Available (*3)
New file (IPv6 address (*1) is included)	New storage systems	N/A	N/A	Available (*4)

Available: The copy path information file can be obtained correctly
N/A: The copy path information file cannot be obtained correctly

*1: IPv6 (Link Local) and/or IPv6 (Connect IP)
*2: Only an IPv4 address is used for the copy path information file
*3: Regarded as an IPv4 address is used for the copy path information file
*4: The IPv6 path information can be obtained correctly

Setting example 1

[Device information]
Storage system 1 (old storage system)
Storage system 2 (old storage system)
Storage system 3 (new storage system) ← Local device
Storage system 4 (new storage system)

[Copy path information]
Storage system 1 – Storage system 2 (IPv4)
Storage system 1 – Storage system 3 (IPv4)
Storage system 3 – Storage system 4 (IPv6)

When the local device is storage system 3 (or storage system 4), load the device information file from the copy path between storage system 1 and storage system 4, and then create the copy path information file.
When the copy path information file that was obtained from storage system 3 (or storage system 4) is applied to the copy path between storage system 1 and storage system 4, the copy path can be used correctly.

Setting example 2

[Device information]
Storage system 1 (old storage system) ← Local device
Storage system 2 (old storage system)
Storage system 3 (new storage system)
Storage system 4 (new storage system)

[Copy path information]
Storage system 1 – Storage system 2 (IPv4)
Storage system 1 – Storage system 3 (IPv4)
Storage system 3 – Storage system 4 (IPv6)

When the local device is storage system 1 (or storage system 2), obtain the copy path information that was applied when setting example 1.
If the relevant copy path information is applied to the copy path between storage system 1 and storage system 4, the IPv6 addresses of storage system 3 and storage system 4 are not applied correctly. In this case, a copy cannot be performed or an unexpected copy path is created.

Caution

- When applying the copy path information file to an old storage system (other models), the [Convert Copy Path] function must be used to convert the format. Refer to "8.2.16 Convert Copy Path" (page 347) for details.
- Make sure to obtain the copy path information file that includes the IPv6 address of the new storage system. If copy path information is obtained from an old storage system to which the copy path information file is already applied, the IPv6 address cannot be obtained correctly. If this copy path information file is applied to the new storage system, copying may not be available or copy paths may be set to an unexpected remote device.

8.2.13 Delete All Copy Path

This function deletes all of the copy path information between local and remote devices registered in the ETERNUS DX Disk storage system.

Caution

- If a copy path, which is being used in an REC, was deleted, it may affect operations, such as the REC being stopped. Confirm that REC is not in use before modifying the information.
  To check whether REC is in use, refer to "8.1.3 Advanced Copy (All Remote Sessions)" (page 261).
- This function deletes all of the copy paths configured in the ETERNUS DX Disk storage system. To delete some of the copy paths, refer to "8.2.12 Set Copy Path" (page 318).

The procedure to delete all of the copy paths is as follows:

Procedure

1. Click [Delete All Copy Path] in [Action].
   → A confirmation screen appears.
2. Click the [OK] button.



   → Deletion of copy paths starts.
3. Click the [Done] button to return to the [Copy Path] screen.

End of procedure

8.2.14 Export All Copy Path

This function exports the copy path information registered in the ETERNUS DX Disk storage system, and saves the information in a file.
The saved file can be used as path information when creating a copy path, so that manual registration of the path information will not be required.

Caution

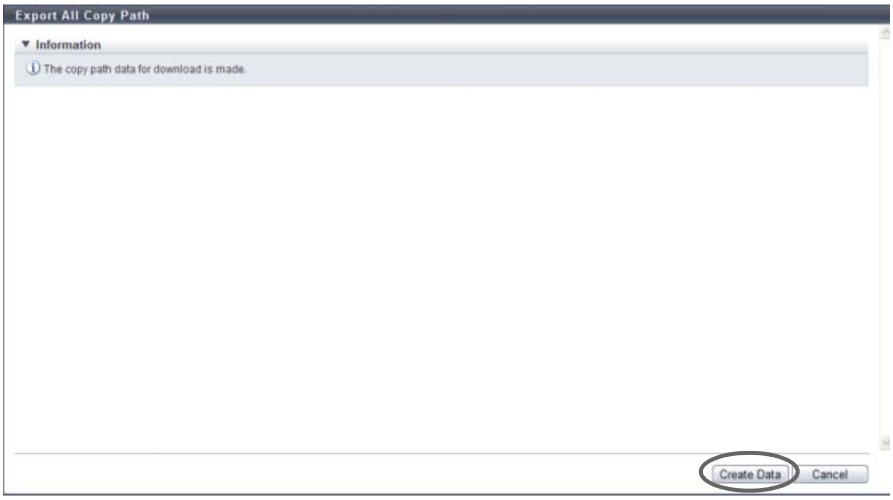
- A copy path information cannot be exported when it has not been registered in the ETERNUS DX Disk storage system.
- The format of the copy path information file has been changed in controller firmware version V10L30. When the copy path information includes an IPv6 address, make sure to export the path information file from an ETERNUS DX Disk storage system with controller firmware version V10L3x or later. An ETERNUS DX Disk storage system with controller firmware version V10L2x or earlier cannot export correct IPv6 addresses.

The procedure to export the copy path information is as follows:

Procedure

1 Click [Export All Copy Path] in [Action].

2 Click the [Create Data] button.

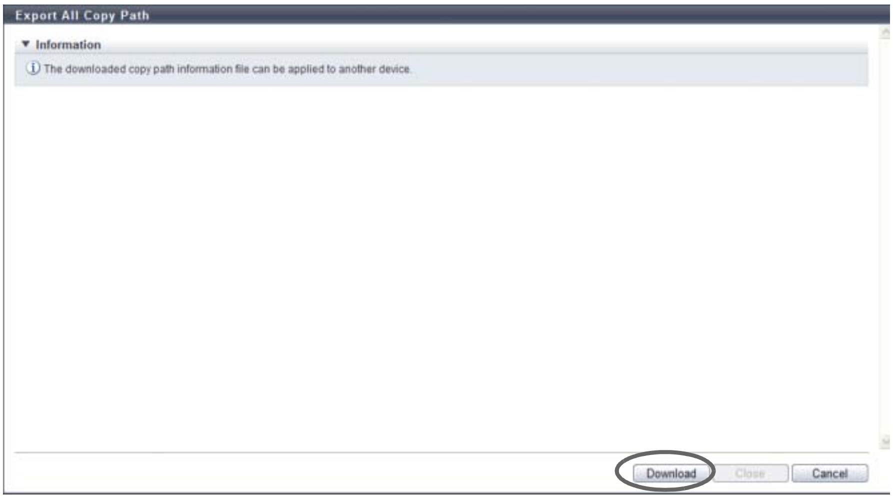


→ The copy path information, which has been registered in the ETERNUS DX Disk storage system, is exported.
After the copy path information export has been finished, a screen to execute downloading the file is displayed.

Caution

If the copy path information has not been registered in the ETERNUS DX Disk storage system, an error screen appears.

3 Click the [Download] button.



→ A dialog box to download the file appears.

4 Save the copy path information file.

The default file name is "RecPath_serial number for the ETERNUS DX Disk storage system_YYYY-MM-DD_hh-mm-ss.bin". (YYYY-MM-DD_hh-mm-ss: the date and time when the download screen (Step 3) is displayed.)

5 Click the [Close] button to return to the [Copy Path] screen.

End of procedure

8.2.15 Export Storage Information

This function exports the FCRA/iSCSI-RA installation information in the ETERNUS DX Disk storage system, and saves the information in a file.
The saved file can be used as device information when creating a copy path, so that manual registration of the device information will not be required.

Caution

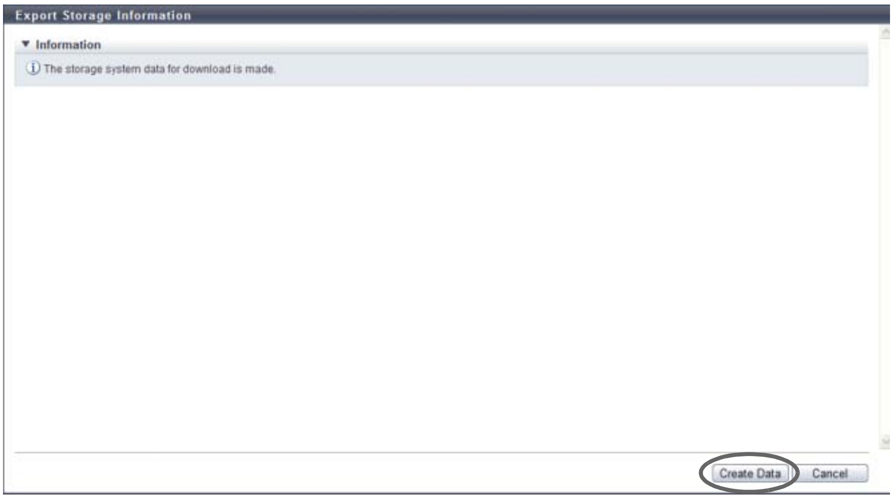
The format of the device information file has been changed in controller firmware version V10L30. A device information file that is obtained using an ETERNUS DX Disk storage system with controller firmware V10L3x or later cannot be applied to an ETERNUS DX Disk storage system with V10L2x or earlier controller firmware when creating a copy path information file. Note that a device information file that is obtained from an ETERNUS DX Disk storage system with controller firmware V10L2x or earlier can be applied to an ETERNUS DX Disk storage system with V10L3x controller firmware.

The procedure to export the REC device information is as follows:

Procedure

1 Click [Export Storage Info] in [Action].

2 Click the [Create Data] button.



→ The REC device information, which has been registered in the ETERNUS DX Disk storage system, is exported.
After the REC device information export has been finished, a screen to execute downloading the file is displayed.

3 Click the [Download] button.



→ A dialog box to download the file appears.

4 Save the REC device information file.

The default file name is "RecRAInfo_serial number for the ETERNUS DX Disk storage system_YYYY-MM-DD_hh-mm-ss.bin".
(YYYY-MM-DD_hh-mm-ss: the date and time when the download screen (Step 3) is displayed.)

5 Click the [Close] button to return to the [Copy Path] screen.

End of procedure

8.2.16 Convert Copy Path

This function outputs the copy path information file for past ETERNUS Disk storage system (hereinafter, referred to as "previous models").
The copy path information file that is created in ETERNUS DX90 S2, ETERNUS DX410 S2/DX440 S2, or ETERNUS DX8100 S2/DX8700 S2 is converted to a file format that can be read by previous models and applied for enabling the execution of Remote Equivalent Copy (REC) with previous models.
The applicable models are shown as follows:

- ETERNUS DX90
- ETERNUS DX410/DX440
- ETERNUS DX8100/DX8400/DX8700
- ETERNUS4000
- ETERNUS8000
- ETERNUS6000

Caution

- Conversion is performed only on the copy path information file created by the procedure in "8.2.12 Set Copy Path" (page 318) or the copy path information file obtained by the procedure in "8.2.14 Export All Copy Path" (page 344).
- This function cannot be executed unless there is an ETERNUS DX Disk storage system set as the conversion target in the copy path information file.

Note

Apply the converted copy path information file to each ETERNUS DX Disk storage system by using the copy path setting function for each ETERNUS DX Disk storage system that is set as a conversion target.

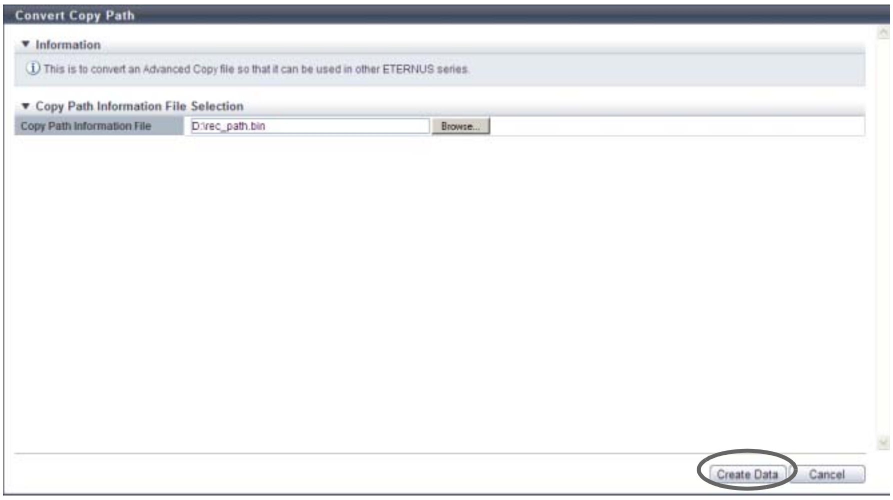
The procedure to convert copy path information file is as follows:

Procedure

1 Click [Convert Copy Path] in [Action].

2 Select the copy path information file that is to be converted, and click the [Create Data] button.

- Copy Path Information File
  This specifies the copy path information file for which the file format is converted.
  Click the [Browse...] button to specify the copy path information file, or directly input the path to the copy path information file.
- Target Device Box ID
  The Box ID of the ETERNUS DX Disk storage system set as file format conversion target in the copy path information file that was read is displayed as an option.
  Select the Box ID of the ETERNUS DX Disk storage system for which the file format is converted.



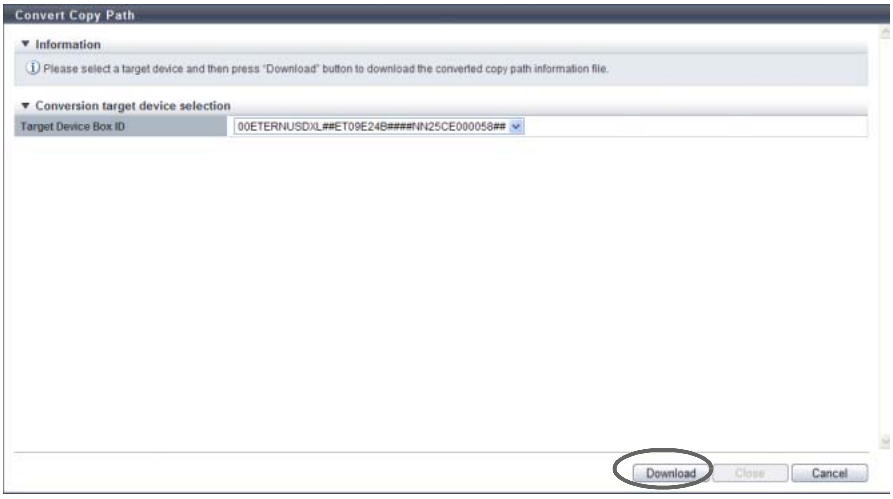
→ The copy path information, which has been registered in the ETERNUS DX Disk storage system, is exported. After the copy path information export has been finished, a screen to execute downloading of the file is displayed.

Caution

An error screen appears in the following conditions:

- When the selected file is not a copy path information file
- When the ETERNUS DX Disk storage system that is to be converted does not exist in the copy path information file

3 Select the ETERNUS DX Disk storage system that is to be converted, and click the [Download] button.



→ A dialog box to download the file appears.

4 Save the copy path information file.

The default file name is "RecPathConvt_serial number for the ETERNUS DX Disk storage system_YYYY-MM-DD_hh-mm-ss.bin".
(YYYY-MM-DD_hh-mm-ss: the date and time when the download screen (Step 3) is displayed.)

5 Click the [Close] button to return to the [Copy Path] screen.

End of procedure

8.2.17 Measure Round Trip Time

This function measures the round trip time between the local device and the remote device.
"Round trip time" is the time taken to make a communication between two devices.
Only one remote device can be measured at a time.

Caution

- Round trip time can be measured only when the connection type is "Remote". Round trip time cannot be measured when the connection type is "Direct".
- Set the REC session status to "Suspend" between devices before measuring.
- Make sure that the physical path is correctly configured between devices before measuring. When a copy path has an error, the round trip time cannot be measured correctly.
- If the path between devices is changed, measure the round trip time again.
- Round trip time measurement requires a maximum of 160 seconds.

The procedure to measure the REC round trip time is as follows:

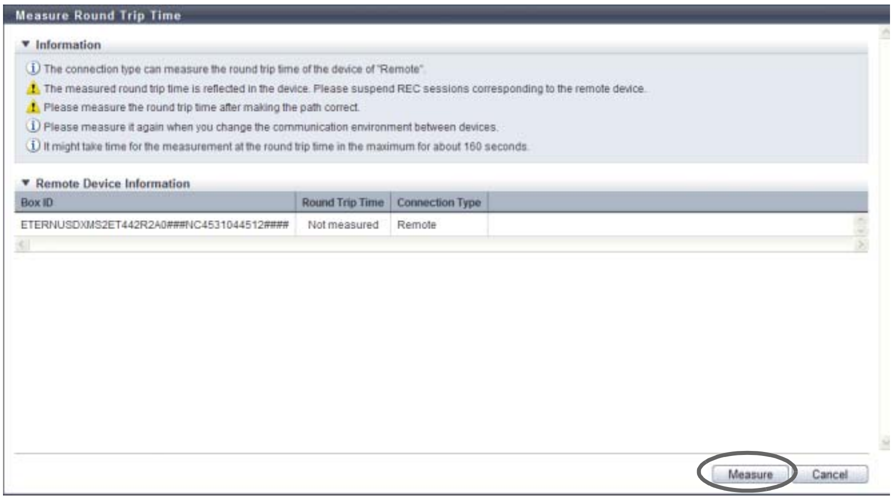
Procedure

1 Select the remote device to measure the REC round trip time, and click [Get Round Trip Time] in [Action].

Caution

A remote device with "Direct" as the connection type cannot be selected.

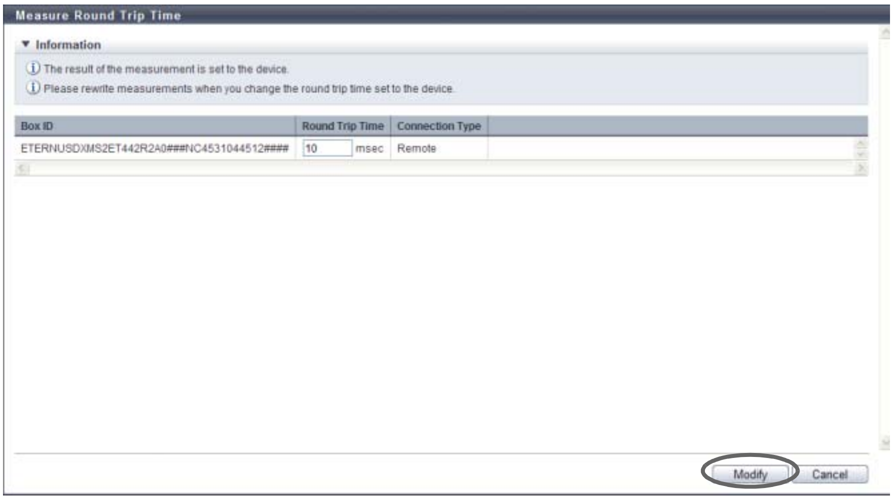
2 Click the [Measure] button.



→ Measurement of round trip time starts.

3 Change the "Round Trip Time (msec)" value if necessary, and click the [Modify] button.

- Round Trip Time (msec)
  The round trip time measurement result between the local device and the remote device is displayed.
  If a measurement error has occurred, the field is blank. The value can be changed. The following describes the recommended round trip time.
  - Asynchronous copy: within 100 (msec)
  - Synchronous copy: within 50 (msec)

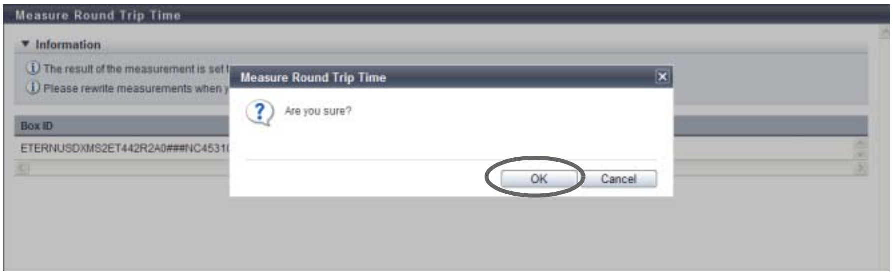


→ A confirmation screen appears.

Caution

- If the round trip time has not been entered, the [Modify] button cannot be clicked.
- If the entered round trip time does not satisfy the input conditions, an error screen appears.

4 Click the [OK] button.



→ The round trip time measurement result is updated in the ETERNUS DX Disk storage system.

5 Click the [Done] button to return to the [Copy Path] screen.

End of procedure

8.2.18 Modify REC Multiplicity

This function specifies multiplicity or priority level when performing Remote Equivalent Copy (REC).
It is not necessary to change the default setting (Auto) for normal use. This function can adjust the copy performance to give priority to REC over work I/O or to reduce the affect on work I/O.

When the local device and the remote device are connected by remote connection

- If "Auto" is selected for the specification mode, REC is performed with the recommended multiplicity that is calculated by the obtained round trip time.
  If the round trip time is not measured, "***" is displayed in the "Recommended Multiplicity" field.
  To display the recommended multiplicity, use the procedure in "8.2.17 Measure Round Trip Time" (page 349).
- If "Manual" is selected for the specification mode, REC will be performed with the specified multiplicity.

When the local device and the remote device are connected by remote connection

- When the priority level is "Automatic", REC is performed using the priority level that is specified using the procedure in "8.2.6 Modify EC/OPC Priority" (page 298).
- When the priority level is from "1" to "8", REC is performed using the specified priority level.

Caution

- If "***" is displayed in the "Recommended Multiplicity" field of the Remote Box ID List, and "Auto" has been selected for the specification mode, REC will not be performed with the appropriate multiplicity. To select "Auto", measure the round trip time using the procedure in "8.2.6 Modify EC/OPC Priority" (page 298).
- If the path between local and remote devices has been changed, measure the round trip time and set the multiplicity again.

The procedure to modify REC multiplicity is as follows:

Procedure

1 Click the [Modify REC Multiplicity] in [Action].

2 Specify the multiplicity, and click the [Set] button.

- Remote Box ID List

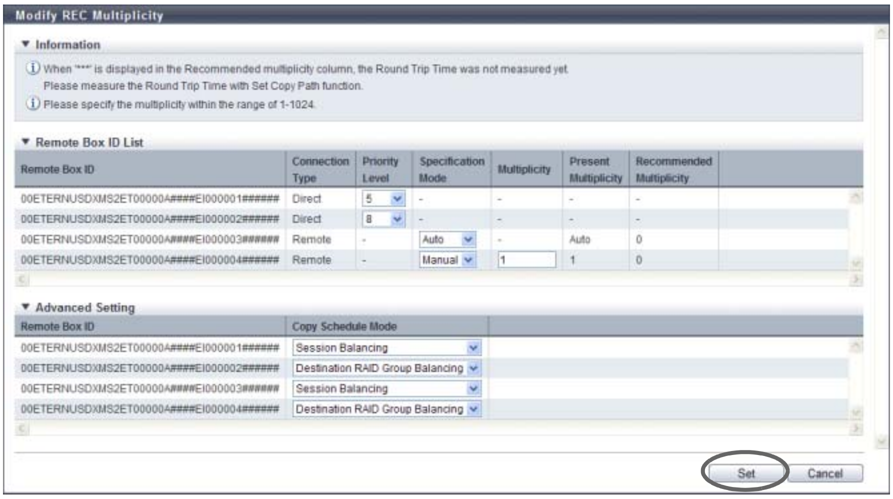
  - Priority Level
    Select the priority level between "1" and "8". When the "Connection Type" is "Remote", a "-" (hyphen) is displayed.
    - Auto
      REC is performed using the priority level (Automatic Priority/High Priority/Middle Priority/Low Priority/Very Low Priority) that is specified with the [Modify EC/OPC Priority] function.
    - 1 - 8
      Specify from "1" to "8" for the REC priority level. "1" corresponds to "Very Low Priority", and "8" corresponds to "High Priority" for the [Modify EC/OPC Priority] function.
  - Specification Mode
    Select the specification mode for multiplicity. If the "Connection Type" is "Direct", a "-" (hyphen) is displayed.
    - Auto
    - Manual
  - Multiplicity
    When the "Specification Mode" is "Manual", specify multiplicity between "1" and "1024". When "Auto" is selected, or when the "Connection Type" is "Direct", a "-" (hyphen) is displayed.

- Advanced Setting

  - Copy Schedule Mode
    Specify the REC copy schedule mode for each remote device. Use "Session Balancing" for normal operation.
    - Session Balancing
      Copy sessions are scheduled evenly to each controlling CM-CPU for a copy source RAID group (a RAID group to which the copy source volume belongs).
    - Destination RAID Group Balancing
      Only one copy session can be performed for each copy destination RAID group. This method prevents unequal loading on a specific RAID group. This may improve the copy performance when the copy source and the copy destination storage systems are connected by direct connection and the copy destination RAID group is configured by Nearline disks.

Caution

- Copy performance is not improved by selecting "Destination RAID Group Balancing" in the following conditions:
  - When the type of the copy destination volume is not "Standard"
  - When the copy destination volume "Standard" and concatenated
- Specify the same copy schedule mode for copy source and copy destination storage systems. If different modes are specified, the copy performance may not improve as expected.



→ A confirmation screen appears.

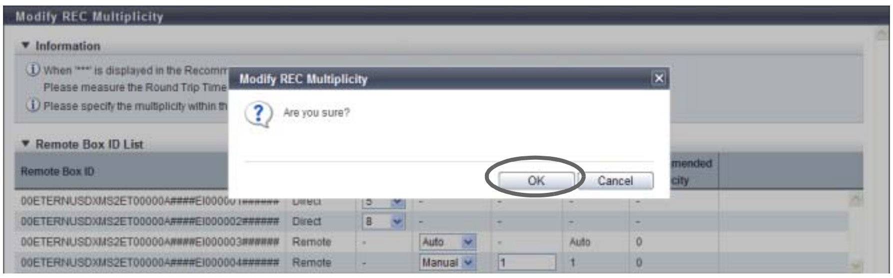
Caution

When "Manual" is selected for "Specification Mode" and numeric characters exceed the allowed range (from 1 to 1024), an error screen appears.

Note

Click [Advanced Setting] to specify the copy schedule mode.

3 Click the [OK] button.



→ The REC multiplicity settings starts.

4 Click the [Done] button to return to the [Copy Path] screen.

End of procedure

8.2.19 Modify REC Buffer

This function sets parameters of the REC Buffer for copying data via the REC Buffer (in Asynchronous Consistency mode).
The "Consistency mode" secures the order of data transfer to the remote device for all of the specified REC sessions. This mode requires constant securement of the dedicated REC Buffer in the cache memory. Copying via REC Buffer stores multiple REC session I/Os in the REC Buffer for a certain period of time, and copies in blocks.

Caution

- Perform REC Buffer settings in both the REC copy source and destination storage systems. Make the REC Buffer size the same for the storage systems of the copy source and the destination. The size will be adjusted to whichever is smaller.
- Take REC reverse operation into consideration and specify the same values for the REC Buffers ("Forwarding Interval", "Monitoring Time", "HALT Wait Timer", "I/O Priority Mode", and "Immediate HALT Mode") in the copy source storage system and the copy destination storage system.
- When changing REC Buffers, suspend the sessions using the target REC Buffers.
- When deleting REC Buffers, stop the sessions using the target REC Buffers.
- When performing bidirectional data transfer, settings for "Send" and "Receive" REC Buffers in the ETERNUS DX Disk storage system are required.
- The following REC Buffer capacity is secured for the cache memory of each controller:
  - ETERNUS DX90 S2: 512MB
  - ETERNUS DX410 S2: 4096MB
  - ETERNUS DX440 S2: 8192MB
  - ETERNUS DX8100 S2/DX8700 S2: 8192MB
- The number of REC Buffers, which can be configured, are as follows:
  - ETERNUS DX90 S2: Up to 4
  - ETERNUS DX410 S2/DX440 S2: Up to 8
  - ETERNUS DX8100 S2/DX8700 S2: Up to 8
- This function cannot be used when the remote device and/or copy path is not set.
- If the usage of the REC Buffer, to which the REC Disk Buffer has already been assigned, is changed to "Receive" or "Unused", the REC Disk Buffer assignment will be cleared (the REC Disk Buffer itself will not be deleted).
- Cache memory is not only used for REC Buffers, but also used for the copy table. Note that the REC Buffer with the maximum size for each model cannot be created depending on the memory capacity in the ETERNUS DX Disk storage system and cache memory allocation for the copy table.

The procedure to set the REC Buffer is as follows:

Procedure

1 Select the target REC Buffers to be modified (multiple selections can be made), and click the [Modify REC Buffer] in [Action].

2 Change the REC Buffer configurations, and click the [Set] button.

● REC Buffer Setting List

- Usage
  Specify the usage of the REC Buffer.
  When setting the REC Buffer for sending, select "Send". When setting the REC Buffer for receiving, select "Receive". When the target REC Buffer is not used, select "Unused".
- Remote Box ID
  Select the Box ID for the remote device.
  If the copy path information is deleted, "???" is displayed. Select "Unused" for REC Buffer usage or select a new remote Box ID.
  If "Unused" is selected for the usage, a "-" (hyphen) is displayed.
- Size
  Select the REC Buffer size.
  If "Unused" is selected for the usage, a "-" (hyphen) is displayed.
  - ETERNUS DX90 S2: 128MB, 256MB, 512MB
  - ETERNUS DX410 S2/DX440 S2: 128MB, 256MB, 512MB, 1024MB, 2048MB
  - ETERNUS DX8100 S2/DX8700 S2: 128MB, 256MB, 512MB, 1024MB, 2048MB
- Forwarding Interval
  Select the data transfer intervals.
  If "Unused" is selected for the usage, a "-" (hyphen) is displayed.
  - 1 sec., 2 sec., 4 sec., 8 sec., 15 sec., 30 sec., 45 sec., 60 sec., 75 sec., 90 sec., 105 sec., 120 sec.
- Monitoring Time
  Specify the monitoring time, before transition to the "Halt" status for a copy session when an REC Buffer shortage occurs. If the REC Buffer is in a high-load state for the specified monitoring time, the copy session is automatically changed to "Halt" state. When "0 min." is specified in this field, REC Buffer shortage monitoring is not performed.
  If "Unused" is selected for the usage, a "-" (hyphen) is displayed.
  - 0 min., 1 min., 2 min., 3 min., 4 min., 5 min., 6 min., 7 min., 8 min., 9 min., 10 min., 11 min., 12 min., 13 min., 14 min., 15 min.
- HALT Wait Timer
  Specify the maximum non-response time. During the non-response time, the host I/O response is stopped to give priority to performing REC Buffer transfers in a high-load state. If the non-response time exceeds the specified value, response to host I/O is restarted. However, the copy session is changed to the "Halt" state. When "0 sec." is specified for this field, ETERNUS DX Disk storage system gives priority to the host I/O, and the copy session is immediately changed to "Halt" state.
  If "Unused" is selected for the usage, a "-" (hyphen) is displayed.
  - 0 sec., 5 sec., 10 sec., 15 sec.

● Advanced Setting

"I/O Priority Mode" and "Immediate HALT Mode" can only be set when setting a copy operation or host I/O tuning for each REC Buffer. It is not necessary to change the default setting ("Disable") for normal use.

- I/O Priority Mode
  Select either "Enable" or "Disable" for the "I/O Priority Mode" of the REC Buffer.
  If "Unused" is selected for the usage, "-" (hyphen) is displayed.
  "I/O Priority Mode" reduces the effect on host I/O when an initial copy for starting, restarting, or recovering the copy function is performed.

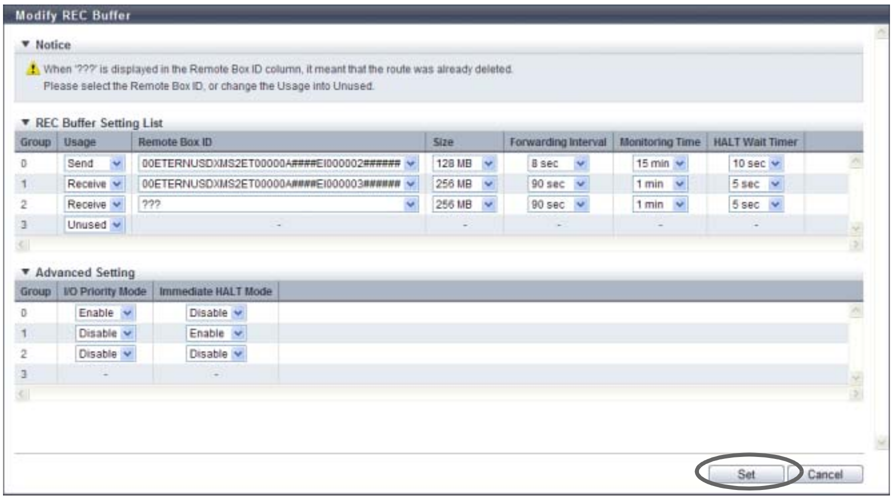
Caution

- This mode should only be used by users who want to maintain host I/O performance as much as possible during REC.
- If "Enable" is selected and host I/O with a high load continues, it may take an extended period of time for the data to reach an equivalent state. Reduce throughput by as much as possible to avoid exceeding the line bandwidth of REC during initial copying.

- Immediate HALT Mode
  Select either "Enable" or "Disable" for the "Immediate HALT Mode" of the REC Buffer.
  If "Unused" is selected for the usage, "-" (hyphen) is displayed.
  "Immediate HALT Mode" reduces the effect on host I/O because of the insufficient of REC Buffer when "HALT Wait Timer" is set to "0 sec.". Enable this item when the response to host I/O is reduced even if "0 sec." is selected for the "HALT Wait Timer".

Caution

- This mode should only be used by users who want to maintain host I/O performance as much as possible during REC.
- Items that are set for this mode are only applied when "0 sec." is selected for "HALT Wait Timer".
- When "Enable" is selected, the ETERNUS DX Disk storage system changes the sessions using the target REC Buffers to "Halt" if the capacity of a REC Buffer is insufficient. If this occurs, the initial copy starts every time when recovering from the "Halt" status and the time required for the order of data transfers cannot be guaranteed, resulting in this process taking an extended period of time.



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- The total size of the REC Buffer is larger than 8192MB (512MB for ETERNUS DX90 S2, and 4096MB for ETERNUS DX410 S2)
- The Box ID for the remote device has been changed
- The same remote Box ID has been selected both for "Send " and for "Receive" as its usage
- When the usage of an REC Buffer is "Send" or "Receive", and its path to the remote Box ID has been deleted
- An REC Buffer, which has already been deleted ("???" is displayed in the "Remote Box ID" field), still exists
- When the setting contents of the REC Buffer has not been changed

Note

- To change the remote Box ID, first specify "Unused" for the use of the corresponding group. Then, click [Modify REC Buffer] again to specify a new remote Box ID and other information in the corresponding group.
- To change "I/O Priority Mode" or "Immediate HALT Mode", click "Advanced Setting".

3 Click the [OK] button.



→ The REC Buffer settings starts.

4 Click the [Done] button to return to the [REC Buffer] screen.

End of procedure

8.2.20 Assign REC Disk Buffer

This function reassigns REC Disk Buffers to an REC Buffer.

Caution

- The REC Disk Buffer can be assigned to an REC Buffer only when the REC Buffer's usage is "Send".
- The following number of REC Disk Buffers can be assigned to one REC Buffer:
  - ETERNUS DX90 S2/DX410 S2: One or two REC Disk Buffers
  - ETERNUS DX440 S2: One, two, or four REC Disk Buffers
  - ETERNUS DX8100 S2/DX8700 S2: One, two, or four REC Disk Buffers
- A single REC Disk Buffer cannot be assigned to multiple REC Buffers.
- When assigning multiple REC Disk Buffers to an REC Buffer, each REC Buffer has the following requirements.
  - The assigned REC Disk Buffers have the same drive type
    ("Online" REC Disk Buffers and "Nearline" REC Disk Buffers can be assigned in the same REC Buffer. However, only assigning either "Online" REC Disk Buffers or "Nearline" REC Disk Buffers is recommended since the available capacity and access performance may be reduced when these REC Disk Buffers are used together.)
  - The assigned REC Disk Buffers have the same number of drives (four or eight)
  - The assigned REC Disk Buffers have the same encryption status ("CM", "-", or "SED")
- When assigning an additional REC Disk Buffer, use one with the same capacity. When using REC Disk Buffers of different capacities, the smallest becomes the standard, and all other REC Disk Buffers are regarded as having the same capacity as the smallest REC Disk Buffer. In this case, the remaining REC Disk Buffer space will NOT be used.

Note

When assigning REC Disk Buffers to REC Buffers, an REC Disk Buffer must be created in advance. Refer to "8.2.21 Create REC Disk Buffer" (page 362) for details.

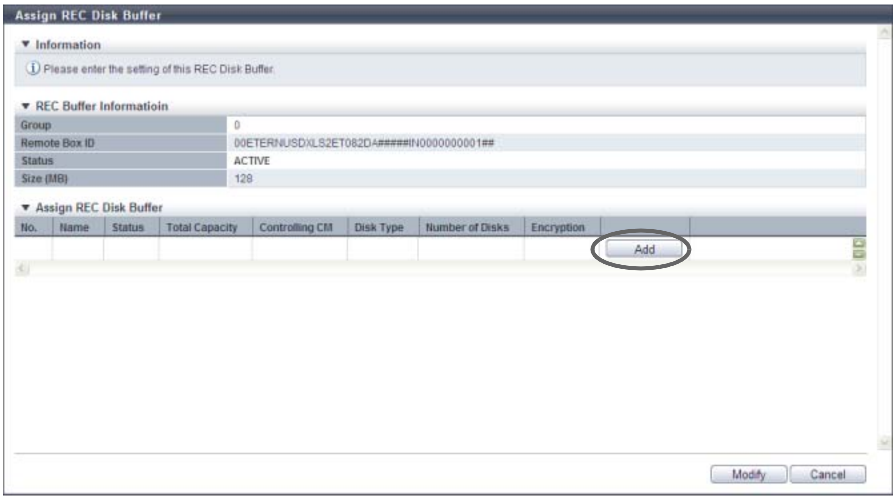
Assigning an additional REC Disk Buffer

The procedure to assign additional REC Disk Buffers to an REC Buffer is as follows:

Procedure

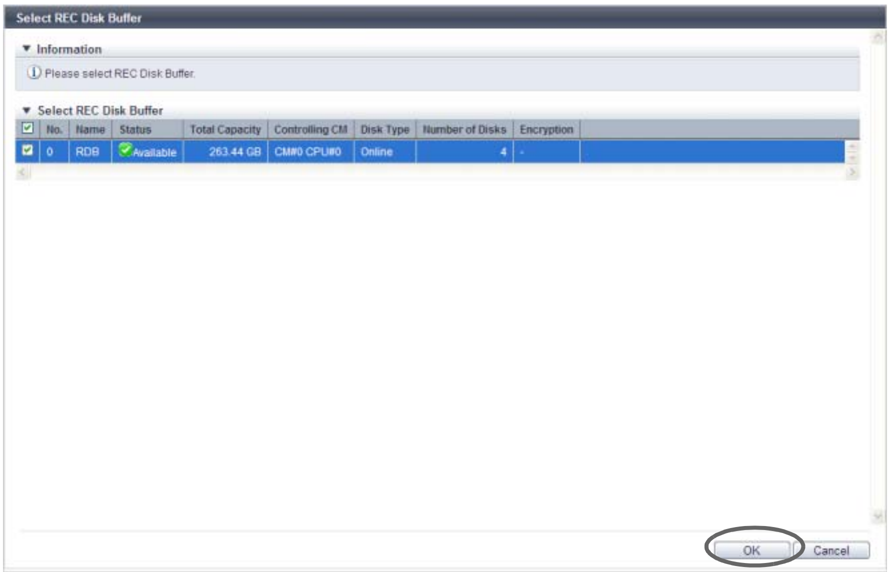
1 Select the REC Buffer, to which the REC Disk Buffer is to be assigned, and click [Assign REC Disk Buffer] in [Action].

2 Click the [Add] button.



→ The screen to add REC Disk Buffer assignment appears.

3 Select the checkbox for the additional REC Disk Buffer to be assigned, and click the [OK] button.



→ The selected REC Disk Buffer is added.

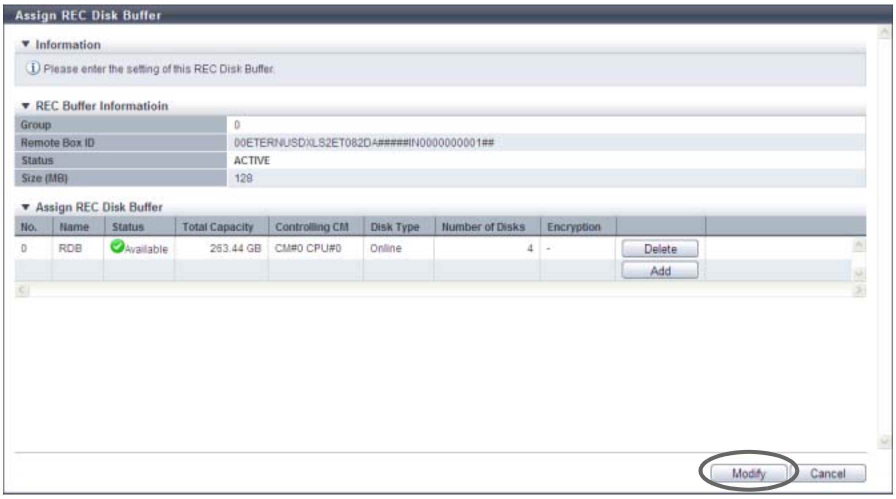
Caution

- When assigning multiple REC Disk Buffers to an REC Buffer, select ones with the same capacity.
- An error screen appears in the following conditions:
  - No REC Disk Buffers, which satisfy the assignment requirements, are registered to the ETERNUS DX Disk storage system
  - The number of REC Disk Buffers, which are assigned to an REC Buffer, exceeds the maximum number which the storage system model supports
  - The selected REC Disk Buffer does not satisfy the assignment requirements
  - The selected REC Disk Buffer does not exist

Note

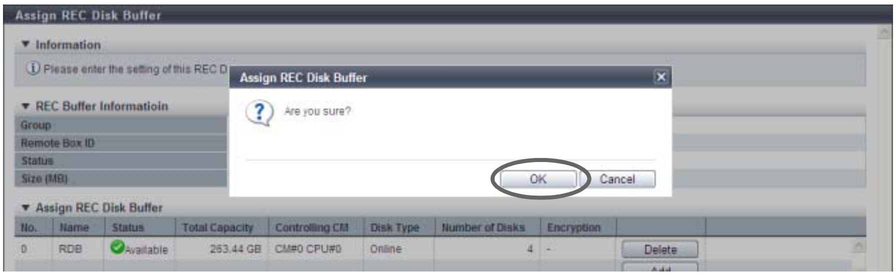
- To delete the assignment of the REC Disk Buffer, click the [Delete] button for the target REC Disk Buffer (RAID group).
- When RAID groups in the REC Disk Buffer are configured with both "Online" and "Nearline" drives, "Online" is displayed.

4 When the REC Disk Buffer assignment has been completed, click the [Modify] button.



→ A confirmation screen appears.

5 Click the [OK] button.



→ The REC Disk Buffer assignment starts.

6 Click the [Done] button to return to the [REC Buffer] screen.

End of procedure

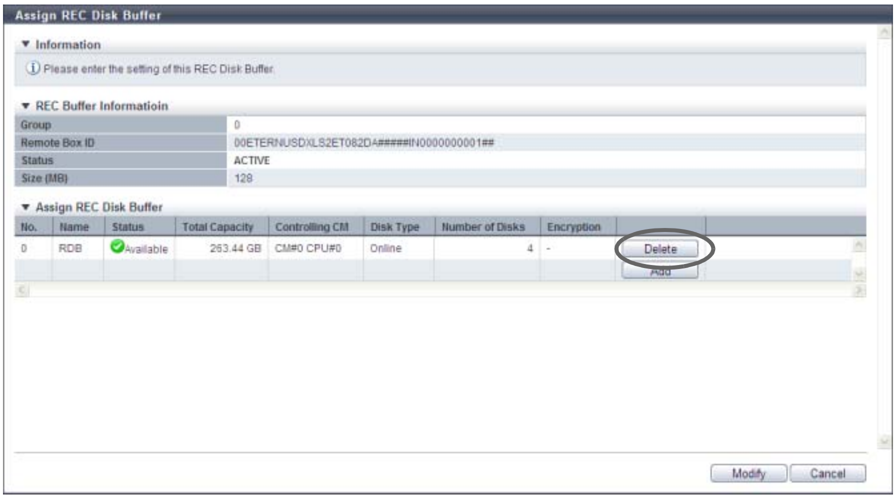
Deleting an REC Disk Buffer assignment

The procedure to delete the assignment of the REC Disk Buffers from the REC Buffer is as follows:

Procedure

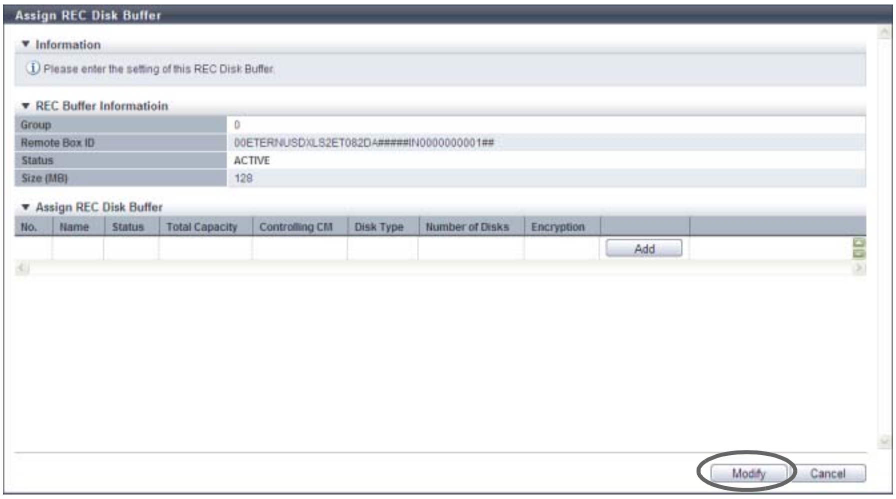
1 Select the REC Buffer to delete the assignment of the REC Disk Buffer, and click [Assign REC Disk Buffer] in [Action].

2 To delete the assignment of the REC Disk Buffer, click the [Delete] button for the target REC Disk Buffer (RAID group).



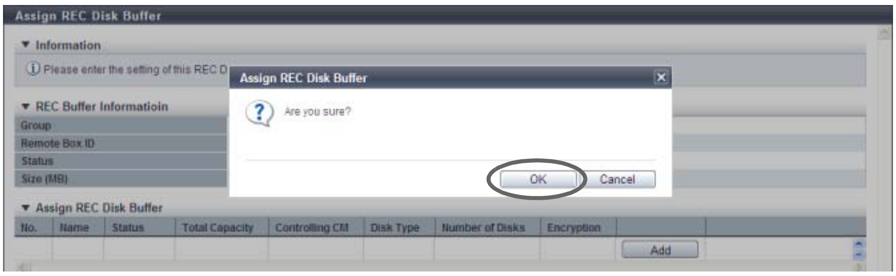
→ The selected REC Disk Buffer is deleted from the list.

3 Click the [Modify] button.



→ A confirmation screen appears.

4 Click the [OK] button.



→ Deletion of an REC Disk Buffer starts.

5 Click the [Done] button to return to the [REC Buffer] screen.

End of procedure

8.2.21 Create REC Disk Buffer

This function creates an REC Disk Buffer.
When using the REC Consistency mode, REC Buffer shortage may occur due to errors (such as a bad line). Note that the copy session will be halted if the REC Buffer shortage extends for a certain period of time. The REC Disk Buffer is used for temporarily saving copy data to avoid these situations.

Caution

- Registering the license for the Advanced Copy feature is required to create an REC Disk Buffer.
- The RAID types, which can be used in REC Disk Buffer, are "High Performance (RAID1+0)" (drive configuration: 2D+2M) and "High Performance (RAID1+0)" (drive configuration: 4D+4M).
- When encryption mode is disabled, an encrypted REC Disk Buffer cannot be created by CM.
- In the following conditions, REC Disk Buffers cannot be created;
  - When Online, SSDs, and SEDs are combined in a single REC Disk Buffer
  - When Nearline, SSDs, and SEDs are combined in a single REC Disk Buffer
  - When resources for creating an REC Disk Buffer (such as the number of RAID groups and volume numbers) are insufficient
    (When the maximum number of RAID groups or volumes is already registered in the ETERNUS DX Disk storage system, a new REC Disk Buffer cannot be created.)

Note

- When the REC Disk Buffer creation process is complete, the REC Disk Buffer will be formatted automatically.
- When assigning multiple REC Disk Buffers to an REC Buffer, each REC Buffer has different conditions. Refer to "8.2.20 Assign REC Disk Buffer" (page 358) for details.

Requirements for Drive Selection

- The requirements for a RAID group that is to be used as an REC Disk Buffer are as follows:
  - The number of member drives is four or eight
  - Different drive types are not selected at the same time
- The following shows the recommended drive configuration of the RAID group:
  - Select drives with the same capacity. If drives of different capacities exist in a RAID group, the smallest becomes the standard, and all other drives are regarded as the same capacity as the smallest drive. In this case, the remaining drive space will NOT be used.
  - Select drives with the same speed. If drives of different speed exist in a RAID group, access performance of the RAID group may be affected.
  - Dividing the mirroring pair drives into different lines (for ETERNUS DX410 S2/DX440 S2)

- The following shows the recommended drive configuration of the ETERNUS DX8100 S2/DX8700 S2:
  - A mirroring pair should be distributed over drives that are connected to different SAS cascades (*1).

    *1: The "SAS cascade" indicates the DEs that are connected to a single BRT port.
    Same SAS cascade:
    DE#x0, DE#x1, DE#x2, DE#x3 (x: 0 - F)
    DE#x8, DE#x9, DE#xA, DE#xB (x: 0 - F)
    [Example] SAS cascade for Port#0 of the BRT#0/#1: DE#00, DE#01, DE#02, DE#03
    [Example] SAS cascade for Port#1 of the BRT#0/#1: DE#10, DE#11, DE#12, DE#13

The procedure to create an REC Disk Buffer is as follows:

Procedure

1 Click [Create REC Disk Buffer] in [Action].

2 Specify the REC Disk Buffer detailed information, and click the [Create] button.

- Name
  Input a RAID group name to be created.
  The following input conditions apply:
  - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space
- Controlling CM
  Select the controlling CM and CPU of the RAID group that is to be created.
  "Automatic" and the installed "CM#x CPU#y" in normal status are displayed as options.
  - Automatic
  - CM#x CPU#y (x: CM number, y: CPU number)

  Select "Automatic" for normal operations. When "Automatic" is selected, the CM-CPU that is to be assigned is determined by the RAID group number. Refer to "Appendix F Automatic Controlling CM-CPU Setting" (page 1011) for details.
- Encryption by CM
  Select the RAID group encryption status with the radio button.
  - On
    Encryption by CM
  - Off
    Unencrypted

  When the encryption mode is disabled, "On" cannot be selected.

Note

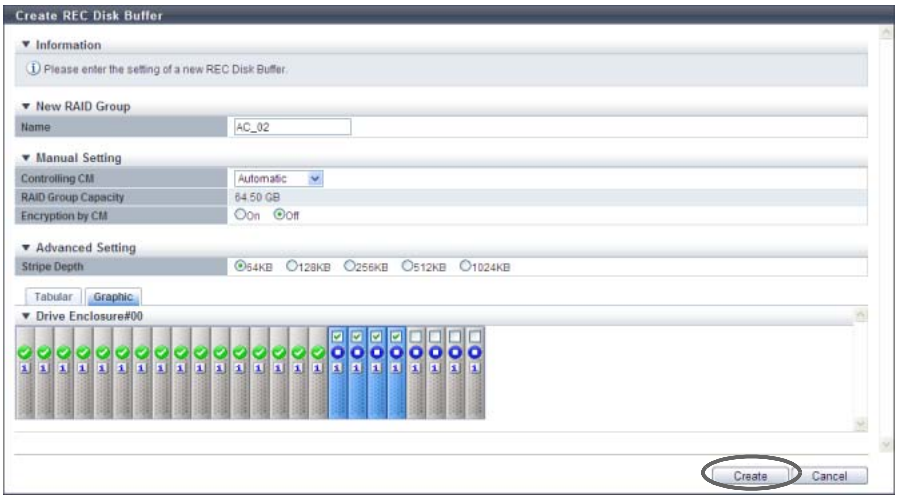
- Drives can be selected from the list of drives that is displayed for Tabular or from the drive images that are displayed for Graphic. Click the Tabular tab to display a list of the drives or click the Graphic tab to display drive images.
- Refer to "Requirements for Drive Selection" (page 362) to select a drive.

- Checkbox to select drives
  Select the checkbox for the drive to be used.

● Advanced Setting

Specify the Stripe Depth only when performing the advanced performance tuning for each RAID group that configures a TPP. It is not necessary to change the default setting (64KB) for normal use.

- Stripe Depth
  Select the Stripe Depth value of the RAID group from 64KB, 128KB, 256KB, 512KB, or 1024KB.



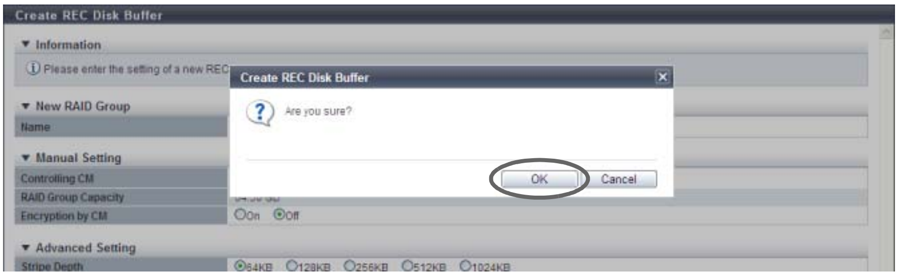
→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When four or eight drives are not selected
- When Online, SSDs, and SEDs are combined in a single REC Disk Buffer
- When Nearline, SSDs, and SEDs are combined in a single REC Disk Buffer
- When the same name for the RAID group is specified as that of an existing RAID group
- When the RAID group name specified in the "Name" filed does not satisfy the input conditions
- When the "Name" is not input

3 Click the [OK] button.



→ Creation of an REC Disk Buffer starts.

4 Click the [Done] button to return to the [REC Disk Buffer] screen.

End of procedure

8.2.22 Delete REC Disk Buffer

This function deletes an REC Disk Buffer.

Caution

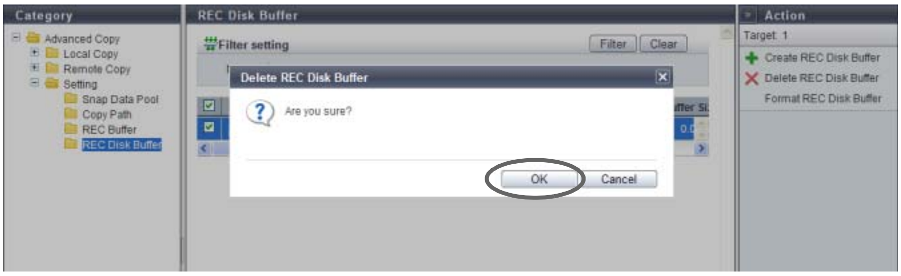
REC Disk Buffers that have been assigned to the REC Buffer cannot be deleted.

The procedure to delete an REC Disk Buffer is as follows:

Procedure

1 Select the REC Disk Buffer that is to be deleted (multiple selections can be made) and click the [Delete REC Disk Buffer] button in [Action].
→ A confirmation screen appears.

2 Click the [OK] button.



→ Deletion of an REC Disk Buffer starts.

Caution

If a selected REC Disk Buffer is assigned to the REC Buffer, an error screen appears.

3 Click the [Done] button to return to the [REC Disk Buffer] screen.

End of procedure

8.2.23 Format REC Disk Buffer

This function formats an REC Disk Buffer.

Caution

- If an in-use REC Disk Buffer is formatted, the data stored in the REC Disk Buffer will be deleted.
- The following REC Disk Buffers cannot be formatted:
  - The status is other than " Available" or " Readying"
  - The REC Disk Buffer is blocked

Note

The newly created REC Disk Buffer will be formatted automatically. In this case, it is not necessary to format the REC Disk Buffer by using this function.

The procedure to format an REC Disk Buffer is as follows:

Procedure

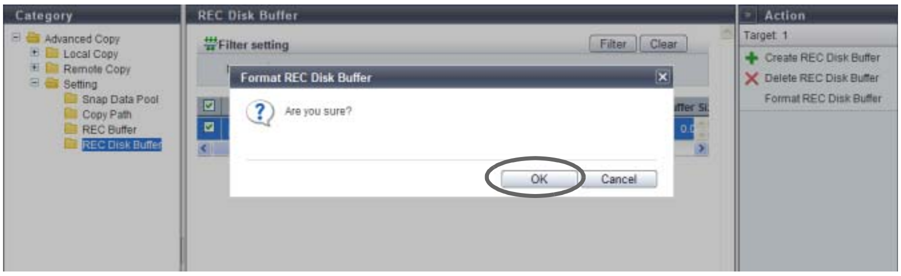
1 Select the REC Disk Buffers to be formatted (multiple selections can be made), and click the [Format REC Disk Buffer] button in [Action].

→ A confirmation screen appears.

Caution

If an in-use REC Disk Buffer is formatted, the data stored in the REC Disk Buffer will be deleted.

2 Click the [OK] button.



→ Formatting of an REC Disk Buffer starts.

3 Click the [Done] button to return to the [REC Disk Buffer] screen.

End of procedure

Chapter 9
Connectivity Management

This chapter describes connectivity management.

9.1 Connectivity Status

Connectivity status displays the status information of volumes.
Connectivity status screens can be displayed by clicking the following categories:

Connectivity status screen	Category
Connectivity (Basic Information)	Connectivity
Host Group	Host Group
FC/FCoE Host	FC
iSCSI Host	iSCSI
SAS Host	SAS
CA Port Group	Port Group
FC Port	FC
iSCSI Port	iSCSI
SAS Port	SAS
FCoE Port	FCoE
LUN Group	LUN Group
Host Response	Host Response
CA Reset Group	CA Reset Group
Host-LU QoS	Host-LU QoS
Host QoS (Basic)	Host QoS
FC/FCoE Host QoS	FC/FCoE
iSCSI Host QoS	iSCSI
SAS Host QoS	SAS
Port QoS (Basic)	Port QoS
FC Port QoS	FC
iSCSI Port QoS	iSCSI
SAS Port QoS	SAS
FCoE Port QoS	FCoE
LU QoS Group	LU QoS Group

Detailed information of the LUN groups can be displayed from the following screens:

- Host Affinity Detail
- Host Group Detail
- LUN Group Detail
- LUN Group : LU QoS Group Detail
- Host-LU QoS Performance Information

9.1.1 Structures for Host Connection

This section describes structures for host connection.

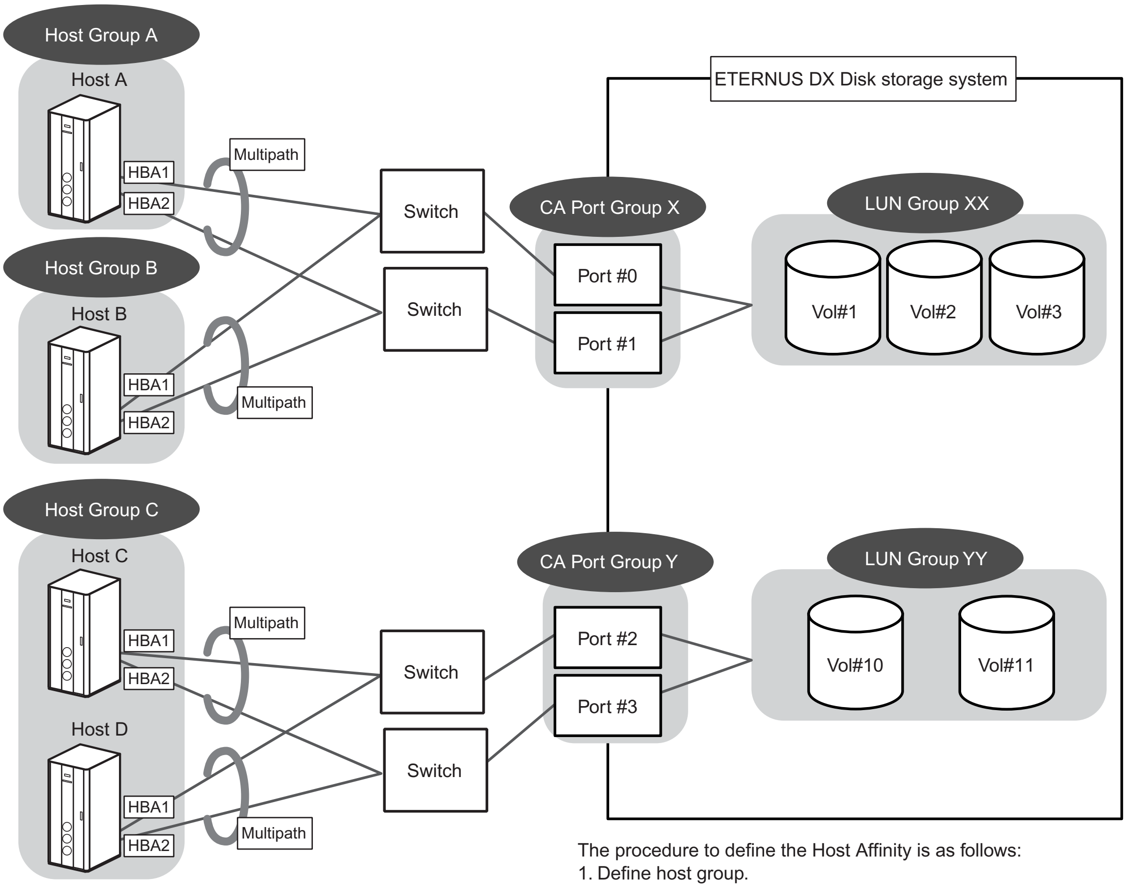
- Host Group
  A host group combines HBAs of the hosts that access the same LUN group into a group (HBAs configure the multipaths). HBAs in multiple hosts can be configured in a single host group. Once a "host group" is created, the settings for hosts (HBAs) in the group can be changed at the same time by changing the "host group" settings. This simplifies the settings that are required to be set for each host (HBA), improving operability.

- CA Port Group
  A CA port group is a group of ports with the same port settings. A CA port group is configured with ports that access the same LUN group, such as ports that are used for multipath connection to the server or for connecting to the cluster configuring server. A single CA port group can be connected to multiple host groups. Once a "CA port group" is created, multiple ports can be selected at the same time for "9.2.1.1 Create Host Affinity" (page 414) and "9.2.1.3 Modify Host Affinity" (page 428). This simplifies the settings that must be set for each port, improving operability.

- LUN Group
  A LUN group is a group of LUNs that is accessed by the same host group and the same CA port group. A LUN group, which was previously referred to as an "affinity group", is mapping information for LUNs and volumes.

- Host Affinity
  The host affinity settings specify associations between a "host group", a "CA port group" and a "LUN group". The new host affinity settings enable the "host affinity setting" function and "LUN mapping" function, which were previously set separately, to be set together. "ON" and "OFF" for the affinity mode is changed by specifying or not specifying the host group that is to be accessed.
  For an ETERNUS DX Disk storage system with firmware version V10L50 or later, a host affinity that associates "host", "CA port", and "LUN group" can be created without creating a "host group" or a "CA port group". Use the procedure that does not create a host group (select "Use "Add Host"") only if the previous procedure for registering hosts in older storage systems (such as the ETERNUS DX410/DX440 or the ETERNUS DX8100/DX8400/DX8700) is used.

Figure 9.1 Basic concept of host connection (when using host groups)



The procedure to define the Host Affinity is as follows:
1. Define host group.
2. Define CA port group.
3. Define LUN group.
4. Allocate the host group, the CA port group, and the LUN group.

Setting examples

- Host group settings (Refer to "9.2.2.1 Add FC/FCoE Host Group" (page 440), "9.2.2.2 Add iSCSI Host Group" (page 448), or "9.2.2.3 Add SAS Host Group" (page 456) for details).

No.	Host group	Host	Host response
1	Host Group A	Host A - HBA1 Host A - HBA2	Default
2	Host Group B	Host B - HBA1 Host B - HBA2	Default
3	Host Group C	Host C - HBA1 Host C - HBA2 Host D - HBA1 Host D - HBA2	Default

- CA port group settings (Refer to "9.2.3.1 Create FC Port Group" (page 517), "9.2.3.2 Create iSCSI Port Group" (page 519), "9.2.3.3 Create SAS Port Group" (page 522), or "9.2.3.4 Create FCoE Port Group" (page 525) for details).

No.	CA port group	Port
1	CA Port Group X	Port#0, Port#1
2	CA Port Group Y	Port#2, Port#3

Port#0: CM#0 CA#0 Port#0
Port#1: CM#1 CA#0 Port#0
Port#2: CM#0 CA#0 Port#1
Port#3: CM#1 CA#0 Port#1

- LUN group settings (Refer to "9.2.4.1 Add LUN Group" (page 574) for details).

No.	LUN group	Host LUN	LUN
1	LUN Group XX	0	Vol#1
		1	Vol#2
		2	Vol#3
2	LUN Group YY	0	Vol#10
		1	Vol#11

- Host affinity settings (Refer to "9.2.1.1 Create Host Affinity" (page 414) for details).

No.	Host group	CA port group	LUN group	Description
1	Host Group A (Default)	CA Port Group X	LUN Group XX	A host affinity with the affinity mode set to "ON".
2	Host Group B (Default)	CA Port Group X	LUN Group XX	A host affinity with the affinity mode set to "ON".
3 (*1)	Host Group C (Default)	CA Port Group Y	LUN Group YY	A host affinity with the affinity mode set to "ON".
4 (*2)	All (Default)	CA Port Group Y	LUN Group YY	A host affinity with the affinity mode set to "OFF".

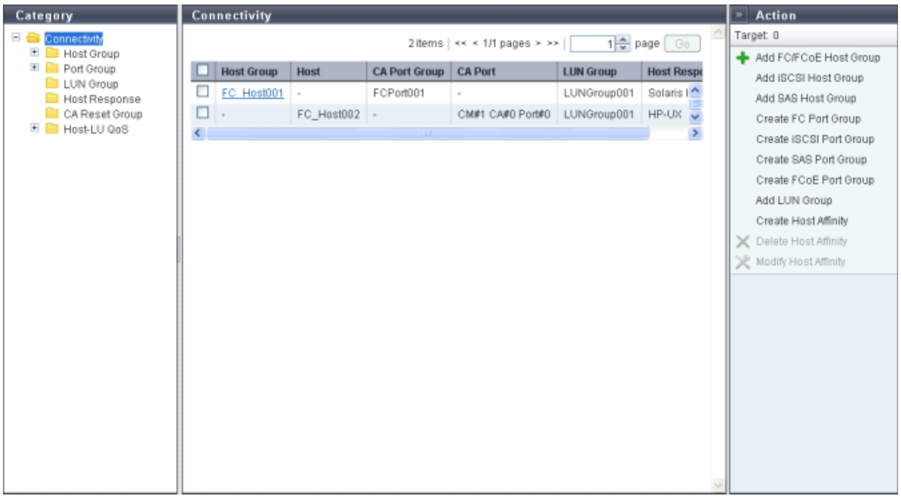
*1: Setting example when specifying a host group that accesses LUN group YY via CA port group Y.
*2: Setting example when a host group that accesses LUN group YY via CA port group Y is not specified.

Caution

- In setting example No.4, LUN groups other than "LUN group YY" cannot be allocated to the "CA port group Y".
- In setting example No.4, the "CA port group Y" for which "All" is selected cannot be used for setting host affinity with the specified host group (setting examples No.3 and No.4 cannot be configured in the same environment).

9.1.2 Connectivity (Basic Information)

A list of the host affinity groups is displayed.



When the target connection is "Host Group - CA Port Group", a host affinity is a group that defines an association between a "Host Group", a "CA Port Group", and a "LUN Group". When the target connection is "Host - CA Port", a host affinity is a group that defines an association between a "Host", a "CA Port", and a "LUN Group".
The host affinity function is used when connecting a specific host group (multiple servers) via switches. By defining the association between a "Host Group", a "Port Group" and a "LUN Group", security is improved since the volumes that the host recognizes can be limited. In addition, by configuring the groups of hosts (HBAs) and ports that access the same LUN group, GUI operation can be simplified.
For an ETERNUS DX Disk storage system with firmware version V10L50 or later, a host affinity that associates "host", "CA port", and "LUN group" can be created without creating a "host group" or a "CA port group".

The following items are displayed in the Main area:

- Host Group or Host
  The "Host Group Name" or "Host Name" with the host affinity setting is displayed. By clicking this item, the [Host Affinity] screen is displayed. Refer to "9.1.9 Host Affinity Detail" (page 403) for display items.
  If "All" is displayed for the "Host Group Name" or "Host Name" field, all of the hosts can access the ETERNUS DX Disk storage system.
  Regardless of whether the host belongs to a host group, a "-" (hyphen) is displayed in the "Host Group" field if the host affinity setting is specified for a host. A "-" (hyphen) is displayed in the "Host" field if the host affinity setting is specified for a host group.

- CA Port Group
  The CA port group names for which the host affinity setting is configured are displayed.
  Regardless of whether the CA port belongs to a CA port group, a "-" (hyphen) is displayed if the host affinity setting is specified for a CA port.

- CA Port
  The location information of the CA port with the host affinity setting is displayed.
  A "-" (hyphen) is displayed if the host affinity setting is allocated for a CA port group.
  - CM#x CA#y Port#z (x: CM number, y: CA number, z: Port number)

- LUN Group
  The names of the LUN groups with host affinity settings are displayed.
  When LUNs are directly associated to CA ports (when LUN mapping is created) by an application other than GUI, the field is blank.

- Host Response
  One of the following host responses is displayed.
  - Host response that is allocated to the host group
  - Host response that is allocated to the host
  - If all of the hosts are to be connected ("All" is displayed in the "Host" field), the host response that was selected when setting the host affinity
    - Solaris MPxIO
    - HP-UX
    - AIX EMPD (*1)
    - AIX VxVM
    - AIX Single Path
    - VS850/SVC
    - Host responses created in the ETERNUS DX Disk storage system
    - Default

  *1: EMPD: ETERNUS Multipath Driver

Caution

The following modifications are applied for the host response settings with firmware version V10L15 or later.

- "Others" is changed to "Default".
- "Windows EMPD", "Linux EMPD", and "Solaris EMPD" are deleted from the "Host Response" value.
  However, these parameters are displayed if they are applied for host groups.
- The setting parameters for "Windows EMPD", "Linux EMPD", and "Solaris EMPD" are the same as "Default".

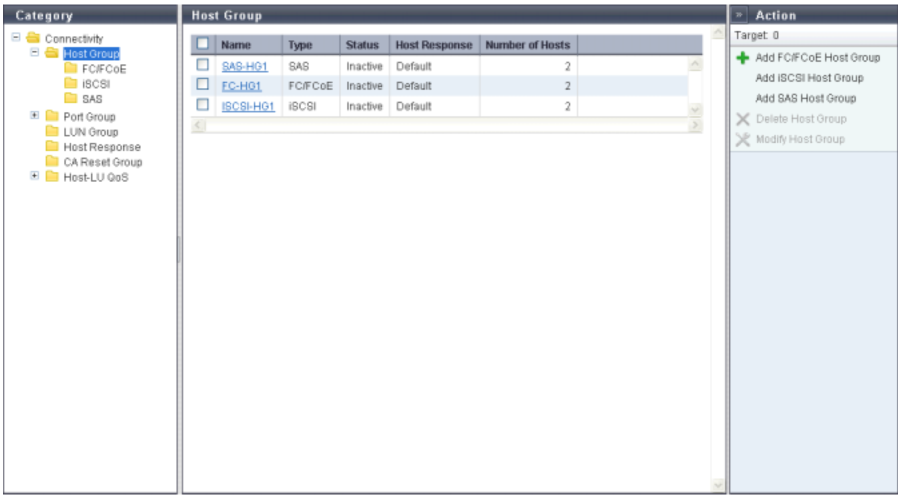
Display Examples of Host Affinities

Display examples for the host affinity are shown in the following table.

Example No.	Display contents						Description
	Host Group	Host	CA Port Group	CA Port	LUN Group	Host Response	
Example 1	Host_Group_xxx	-	Port_Group_xxx	-	LUN_Group_xxx	Host_Response1	The host affinity setting has been configured in "Host_Group_xxx", "Port_Group_xxx" and "LUN_Group_xxx". The server recognizes the LUN group, "LUN_Group_xxx", which has been specified for each member host (HBA) in "Host_Group_xxx".
Example 2	All	All	Port_Group_yyy	-	LUN_Group_yyy	Host_Response2	All servers will be covered. The server recognizes the specified LUN group, "LUN_Group_yyy", from every member port in "Port_Group_yyy".
Example 3	-	Host_z	-	CM#0 CA#0 Port#0	LUN_Group_zzz	Host_Response3	The host affinity setting of "Host_z (HBA)" and "LUN Group_zzz" has been configured to the device side CA port, "CM#0 CA#0 Port#0". Hosts, CA ports, and LUN groups are allocated without specifying a host group or CA port group.
Example 4	-	All	-	CM#1 CA#1 Port#1	LUN_Group_www	Host_Response4	The LUN mapping of "LUN_Group_www" has been configured to the device side CA port, "CM#1 CA#1 Port#1". Hosts, CA ports, and LUN groups are allocated without specifying a host group or CA port group.
Example 5	-	All	-	CM#0 CA#1 Port#1		Host_Response5	The LUN is directly allocated to CA port "CM#0 CA#1 Port#1" by an application other than GUI (LUN mapping is created).

9.1.3 Host Group

The list of the host groups is displayed.
A host group uses the same interface type, and groups the hosts (HBAs), which access the same LUN group.



The following items are displayed in the Main area:

- Name
  The host group name is displayed.
  By clicking this item, the [Host Group Detail] screen is displayed. Refer to "9.1.10 Host Group Detail" (page 404) for display items.

- Type
  The interface type of the host registered in the host group is displayed.

- Status
  Whether the host group is used ("Active") or not ("Inactive") for the host affinity settings is displayed.
  "Host affinity setting" is to specify association between "Host Group", "CA Port Group", and "LUN Group".
  - Active
    The host group is used for the host affinity settings. The LUN group can be accessed from the member host of the host group.
  - Inactive
    The host group is not used for the host affinity settings.

- Host Response
  The host response name, which has been assigned to a host group, is displayed.

- Number of Hosts
  The number of hosts, which have been registered in the host group, is displayed.

Filter setting

The filter setting field is displayed only for ETERNUS DX8700 S2.

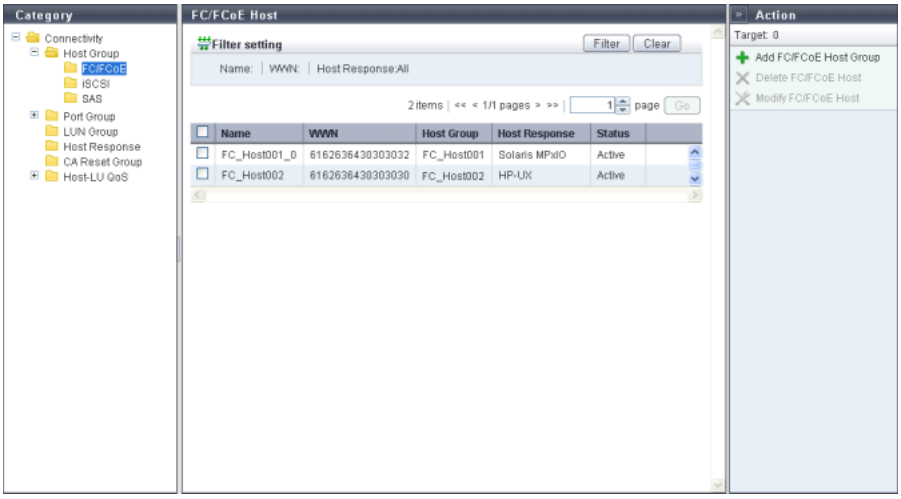
Filter	Description
Name	Input the host group name that is to be displayed. When not using the host group name for filtering, leave this item blank.
Type	Select the interface type for the host group that is to be displayed.
Status	Select the host group status that is to be displayed.
Host Response	Select the host response name that is to be displayed.

9.1.3.1 FC/FCoE Host

In this screen, registered FC/FCoE hosts in the ETERNUS DX Disk storage system are displayed.

Note

The interface types "FC" and "FCoE" are both regarded as "FC". Both "FC host" and "FCoE host" are abbreviated as "FC host" in this section.



The following items are displayed in the Main area:

- Name
  The FC host name is displayed.

- WWN
  The FC host WWN is displayed.

- Host Group
  The host group name, to which the FC host belongs, is displayed.
  When the FC host belongs to two host groups, the host group names are separated with a ", (comma)" and displayed. If the FC host belongs to three or more host groups, the names of the first two groups and a [more...] link are displayed.
  If the FC host does not belong to a host group, a "-" (hyphen) is displayed.

- Host Response
  The host response that is assigned to the FC host or to the host group of the FC host is displayed.

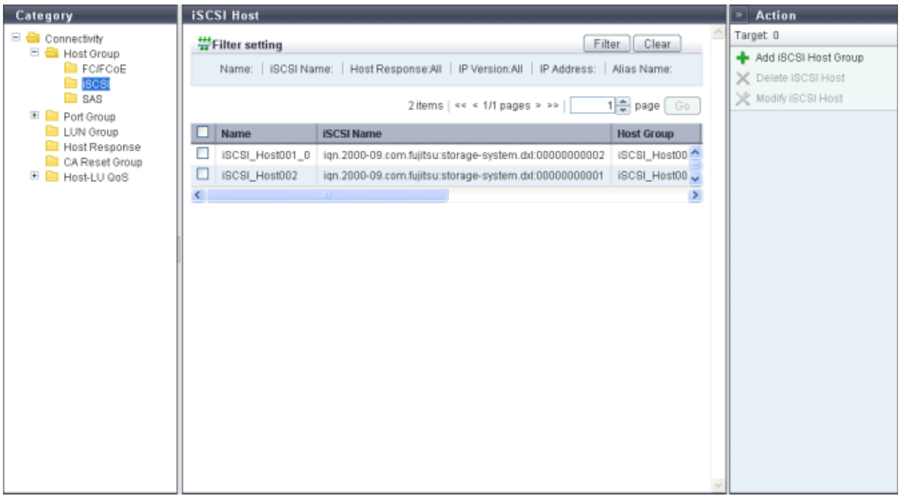
- Status
  Whether the host affinity setting is applied to the FC host is displayed.
  "Host Affinity Setting" is to specify association between "Host Group", "CA Port Group", and "LUN Group" or association between "Host", "CA Port", "and "LUN Group". The host affinity setting specifies the path between each host and port.
  - Active
    The host affinity setting is applied to the FC host. The LUN group can be accessed from the FC host.
  - Inactive
    The host affinity setting is not applied to the FC host.

Filter setting

Filter	Description
Name	Input the FC host name that is to be displayed. When not using the FC host name for filtering, leave this item blank.
WWN	Input the WWN that is to be displayed. When not using the WWN for filtering, leave this item blank.
Host Response	Select the host response name that is to be displayed. The FC hosts, to which the same host response has been assigned, can be used for filtering.

9.1.3.2 iSCSI Host

In this screen, registered iSCSI hosts in the ETERNUS DX Disk storage system are displayed.



The following items are displayed in the Main area:

- Name
  The iSCSI host name is displayed.

- iSCSI Name
  The iSCSI name of the iSCSI host is displayed.

- Host Group
  The host group name, to which the iSCSI host belongs, is displayed.
  When the iSCSI host belongs to two host groups, the host group names are separated with a ", (comma)" and displayed. If the iSCSI host belongs to three or more host groups, the names of the first two groups and a [more...] link are displayed.
  If the iSCSI host does not belong to an host group, a "-" (hyphen) is displayed.

- Host Response
  The host response that is assigned to the iSCSI host or to the host group of the iSCSI host is displayed.

- Status
  Whether the host affinity setting is applied to the iSCSI host is displayed.
  "Host Affinity Setting" is to specify association between "Host Group", "CA Port Group", and "LUN Group" or association between "Host", "CA Port", "and "LUN Group". The host affinity setting specifies the path between each host and port.
  - Active
    The host affinity setting is applied to the iSCSI host. The LUN group can be accessed from the iSCSI host.
  - Inactive
    The host affinity setting is not applied to the iSCSI host.

- IP Version
  The IP version when the IP address was registered for the iSCSI host is displayed.

- IP Address
  The IP address of the iSCSI host is displayed.
  Note that the IPv6 address is displayed as an abbreviation. Refer to "IPv6 Address Notation" (page 378) for details.
  If the IP address is not specified, the field is blank.

- Alias Name
  The iSCSI host Alias Name is displayed.
  If the Alias Name is not set, the field is blank.

- CHAP User ID
  The iSCSI host user ID is displayed.
  If the user ID is not set, the field is blank.

Filter setting

Filter	Description
Name	Input the iSCSI host name that is to be displayed. When not using the iSCSI host name for filtering, leave this item blank.
iSCSI Name	Input the iSCSI name that is to be displayed. When not using the iSCSI name for filtering, leave this item blank.
Host Response	Select the host response name that is to be displayed. The iSCSI hosts, to which the same host response has been assigned, can be used for filtering.
IP Version	Select the IP version that is to be displayed. The iSCSI hosts with the same IP version are displayed.

Filter	Description
IP Address	Input the IP address that is to be displayed. ETERNUS DX Disk storage system compares the input IP address and the existing IP address by starting from the first letter. The iSCSI hosts with the same IP address are displayed. An abbreviation for the IPv6 address can be used. When not using the IP address for filtering, leave this item blank.
Alias Name	Input the Alias Name that is to be displayed. iSCSI hosts matching or partially matching the input Alias Name are displayed. When not using the Alias Name for filtering, leave this item blank.

IPv6 Address Notation

Since the IPv6 address is 128-bit and extremely long, this address is displayed using "xxxx", which describes 16-bit in hexadecimals as being one block that is separated by colons (":").

xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx

- Use 0 - ffff (FFFF) (hexadecimal, alphanumeric characters) for inputting an IPv6 address.
- The current setting is displayed with 0 - ffff (hexadecimal, "a" - "f" are lowercase letters)
- Up to 128-bit
- The first 64-bit (prefix) of the link local address is fixed to "fe80::".

The following three abbreviation methods are available for IPv6 addresses:

(1) Omission of the first "0" of a block that follows consecutive zeros.

[Example] 2001:1000:0120:0000:0000:0123:0000:0000

2001:1000:120:0000:0000:123:0000:0000

(2) Replacement of "0000" blocks with "0".

[Example] 2001:1000:120:0000:0000:123:0000:0000

2001:1000:120:0:0:123:0:0

(3) Replacement of a block with consecutive zeros by "::" is performed only once.

[Example] 2001:1000:120:0:0:123:0:0

2001:1000:120::123:0:0 is OK

2001:1000:120::123:: is not allowed

(Replacement of a block with consecutive zeros by "::" is allowed only once.)

Caution

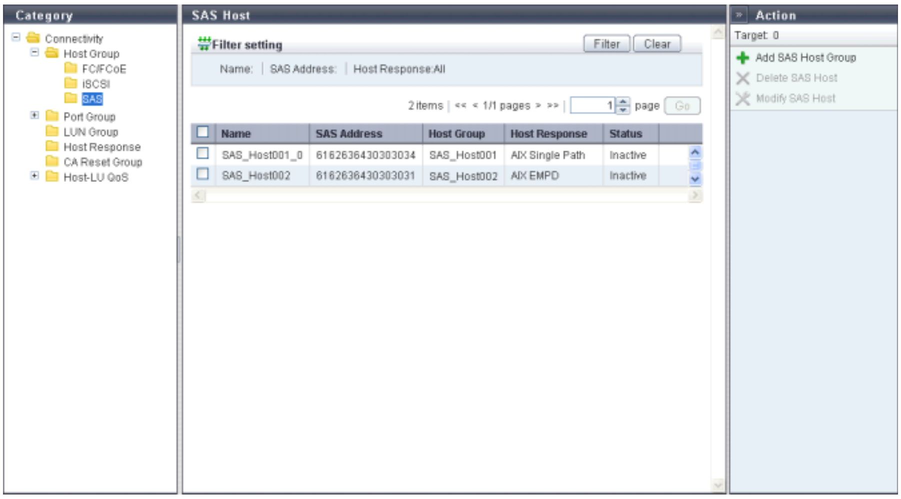
The following IP addresses cannot be specified:

- Link local addresses (the address starts with "fe80::") for which all of the values for the low 64-bit are "0"
- Connect IP addresses (*1) for which the first 3-bit are not "001" or the first 7-bit are not "1111110"

*1: The connect IP address indicates either a "global address", "unique local address", or "6to4 address". Note that this limitation is not applied when specifying IP addresses for "Common Name". This limitation also does not apply when specifying "Subject Alt Name" for "11.2.3.15 Create Self-signed SSL Certificate" (page 787) or "11.2.3.16 Create Key/CSR" (page 790).

9.1.3.3 SAS Host

In this screen, registered SAS hosts in the ETERNUS DX Disk storage system are displayed.



The following items are displayed in the Main area:

- Name
  The SAS host name is displayed.

- SAS Address
  The SAS address of the SAS host is displayed.

- Host Group
  The host group name, to which the SAS host belongs, is displayed.
  When the SAS host belongs to two host groups, the host group names are separated with a ", (comma)" and displayed. If the SAS host belongs to three or more host groups, the names of the first two groups and a [more...] link are displayed.
  If the SAS host does not belong to a host group, a "-" (hyphen) is displayed.

- Host Response
  The host response that is assigned to the SAS host or to the host group of the SAS host is displayed.

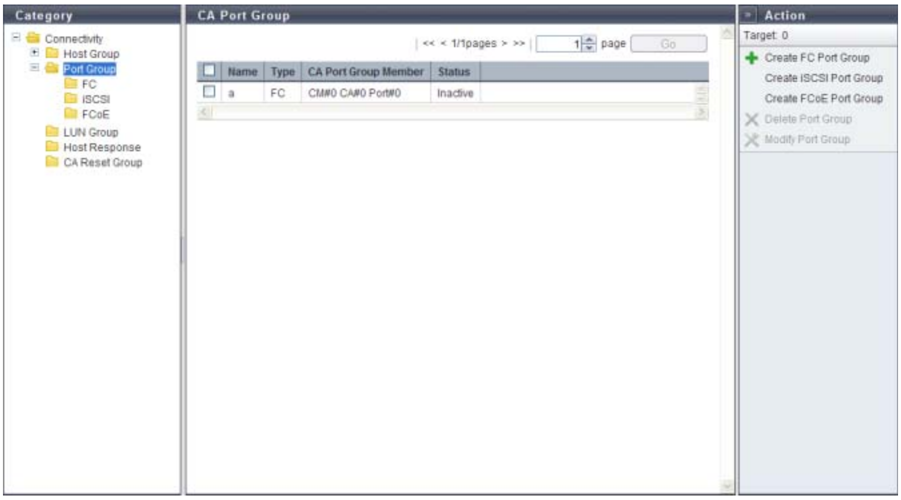
- Status
  Whether the host affinity setting is applied to the SAS host is displayed.
  "Host Affinity Setting" is to specify association between "Host Group", "CA Port Group", and "LUN Group" or association between "Host", "CA Port", "and "LUN Group". The host affinity setting specifies the path between each host and port.
  - Active
    The SAS host is used for the host affinity settings. The LUN group can be accessed from the SAS host.
  - Inactive
    The SAS host is not used for the host affinity settings.

Filter setting

Filter	Description
Name	Input the SAS host name that is to be displayed. When not using the SAS host name for filtering, leave this item blank.
SAS Address	Input the SAS address that is to be displayed. When not using the SAS address for filtering, leave this item blank.
Host Response	Select the host response name that is to be displayed. The SAS hosts, to which the same host response has been assigned, can be used for filtering.

9.1.4 CA Port Group

A list of the CA port groups is displayed.
A CA port group is a group of the same CA type ports that are connected to the specified host group.



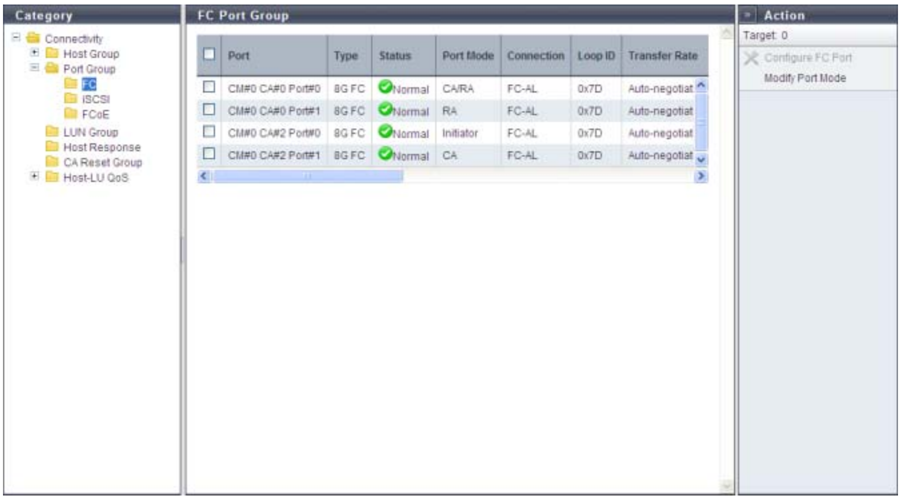
The following items are displayed in the Main area:

- Name
  The port group name is displayed.
- Type
  The type of the CA port group is displayed.
  - FC
  - iSCSI
  - SAS
  - FCoE
- CA Port Group Member
  The location information of the port, which is a CA port group member, is displayed.
  If there are two CA port group members, the ports are displayed, being separated with a ", (comma)". If there are three or more ports, the location information of the two ports and the [more...] link are displayed.
  - CM#x CA#y Port#z (x: CM number, y: CA number, z: Port number)

- Status
  Whether the CA port group is used ("Active") or not ("Inactive") for the host affinity settings is displayed. "Host affinity setting" is to specify association between "Host Group", "CA Port Group" and "LUN Group".
  - Active
    The CA port group is used for the host affinity settings. The LUN group can be accessed from the host group via the CA port group.
  - Inactive
    The CA port group is not used for the host affinity settings. The CA port group is not being used.

9.1.4.1 FC Port

Parameters of the FC ports that are registered in the ETERNUS DX Disk storage system are displayed.



The following items are displayed in the Main area:

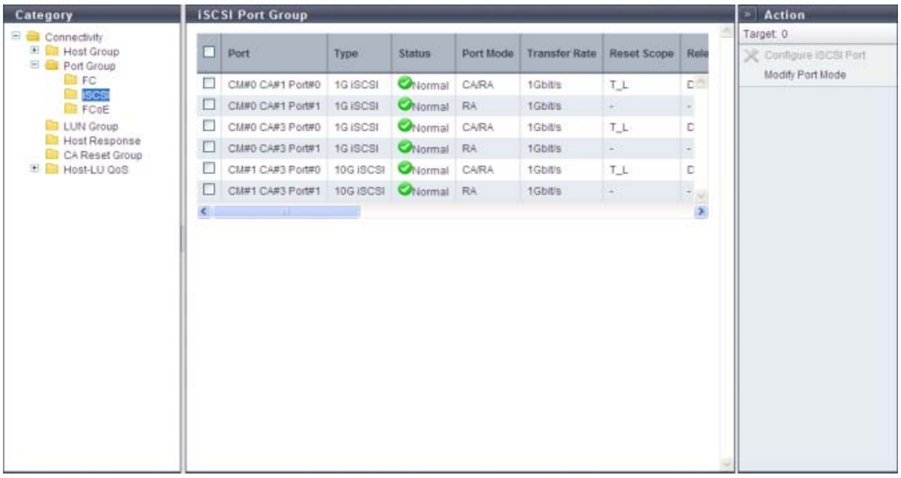
- Port
  The location information of the target port is displayed.
  - CM#x CA#y Port#z (x: CM number, y: CA number, z: Port number)
- Type
  The CA type of the target port is displayed.
  - 8G FC
    8Gbit/s (maximum) FC. The port mode can be changed (CA, RA, CA/RA, or Initiator).
  - 16G FC
    16Gbit/s (maximum) FC. The port mode can be changed (CA, RA, CA/RA, or Initiator).
- Status
  The status of the target port is displayed.
- Port Mode
  The mode of the target port is displayed.
  - CA
  - RA
  - CA/RA
  - Initiator

- Connection
  The connection type of the target port is displayed.
  - Fabric
    A connection type that enables simultaneous communication among multiple nodes through a Fibre Channel switch. This connection type can also be used for a direct connection when "Transfer Rate" is "16 Gbit/s".
  - FC-AL
    A connection type that connects multiple nodes in a loop.
- Loop ID
  If the connection type of the target port is "FC-AL", the Loop ID is displayed.
  "Loop ID" is an identification number of a node in a loop.
  When the connection type of the target port is "Fabric", a "-" (hyphen) is displayed.
- Transfer Rate
  The transfer speed of the target port is displayed.
  - Auto-negotiation
  - 2 Gbit/s
  - 4 Gbit/s
  - 8 Gbit/s
  - 16 Gbit/s
- FC Frame Size
  The frame size of the target port is displayed.
  "FC Frame Size" specifies the length of the communication information.
  - 512 bytes
  - 1024 bytes
  - 2048 bytes
- Reset Scope
  The reset scope of the target port is displayed.
  Reset scope is the range where the command reset from the server is performed, when the target port is connected to multiple servers.
  A "-" (hyphen) is displayed when the port mode is "RA".
  - I_T_L (I: Initiator, T: Target, L: LUN)
    Reset (cancel) the command request from the server that sent the command reset request.
  - T_L (T: Target, L: LUN)
    Reset (cancels) the command request from all of the servers that are connected to the port.
- Release Reservation if Chip is Reset
  Whether the function to release the reservation status of the volume when the target port (chip) is reset is enabled or disabled is displayed.
  A "-" (hyphen) is displayed when the port mode is "RA" or "Initiator".
- REC Line No.
  The REC line number of the target port is displayed.
  The REC line number is used to switch the communication path when a line fails.
  A "-" (hyphen) is displayed when the port mode is "CA" or "Initiator".

- REC Transfer Mode
  Whether the REC synchronous transfer mode, the REC asynchronous stack mode, the REC asynchronous consistency mode, or the REC asynchronous through mode is enabled or disabled for the target port is displayed.
  A "-" (hyphen) is displayed when the port mode is "CA" or "Initiator".
  - Sync
    When the REC synchronous transfer mode is enabled, the target port can be used as an REC synchronous transfer mode path.
  - Async Stack
    When the REC asynchronous stack mode is enabled, the target port can be used as an REC asynchronous stack mode path.
  - Async Consistency
    When the REC asynchronous consistency mode is enabled, the target port can be used as an REC asynchronous consistency mode path.
  - Async Through
    When the REC asynchronous through mode is enabled, the target port can be used as an REC asynchronous through mode path.

9.1.4.2 iSCSI Port

Parameters of the iSCSI ports that are registered in the ETERNUS DX Disk storage system are displayed.



The following items are displayed in the Main area:

- Port
  The location information of the target port is displayed.
  - CM#x CA#y Port#z (x: CM number, y: CA number, z: Port number)

- Type
  The type of the target port is displayed.
  - 1G iSCSI
    1Gbit/s iSCSI. The port mode can be changed (CA, RA, or CA/RA).
  - 10G iSCSI
    10Gbit/s iSCSI. The port mode can be changed (CA, RA, or CA/RA).
  - iSCSI-RA (for older storage system connection)
    1Gbit/s iSCSI-RA. It is used for REC for the ETERNUS DX400 series, the ETERNUS DX8000 series, the ETERNUS4000, and the ETERNUS8000.

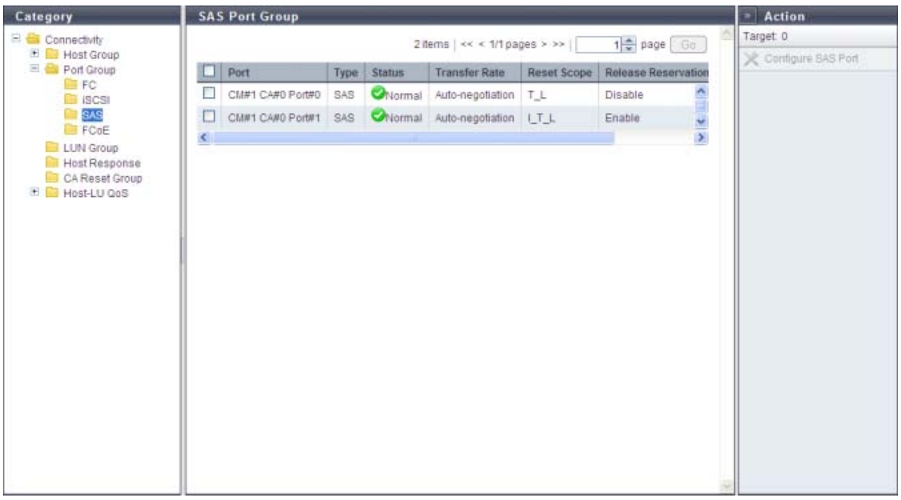
- Status
  The status of the target port is displayed.
- Port Mode
  The mode of the target port is displayed.
  - CA
  - RA
  - CA/RA
- Transfer Rate
  The transfer speed of the target port is displayed. All transfers are full-duplex.
  - Auto-negotiation
  - 1Gbit/s
  - 10Gbit/s
  - 100Mbit/s
- Reset Scope
  The reset scope of the target port is displayed.
  Reset scope is the range where the command reset from the server is performed, when the target port is connected to multiple servers. A "-" (hyphen) is displayed when the port mode is "RA".
  - I_T_L (I: Initiator, T: Target, L: LUN)
    Reset (cancel) the command request from the server that sent the command reset request.
  - T_L (T: Target, L: LUN)
    Reset (cancels) the command request from all of the servers that are connected to the port.
- Release Reservation if Chip is Reset
  Whether the function to release the reservation status of the volume when the target port (chip) is reset is enabled or disabled is displayed.
  A "-" (hyphen) is displayed when the port mode is "RA".
- iSCSI Name
  The iSCSI name of the target port is displayed.
- Alias Name
  The Alias Name of the target port is displayed.
  If the Alias Name is not specified, the field is blank.
- Bandwidth Limit
  The bandwidth limit of the target port is displayed.
  This item is displayed when the WAN bandwidth that can be used for REC is designated.
  A "-" (hyphen) is displayed when the type is "1G iSCSI" or "10G iSCSI".
- MTU
  The MTU size of the target port is displayed.
  "Maximum Transmission Unit (MTU)" is the maximum amount of data that can be transmitted at the one time over the communication network.
  A "-" (hyphen) is displayed when the port mode is "CA".
- CHAP
  When CHAP authentication for the target port is enabled, "ON" is displayed. If the authentication is disabled, "OFF" is displayed.
  When the "Port Mode" is "CA/RA", this item is displayed in "x / y" format.
  x: The CHAP authentication status of the CA port ("ON" or "OFF")
  y: The CHAP authentication status of the RA port ("ON" or "OFF")

- REC Line No.
  The REC line number of the target port is displayed.
  The REC line number is used to switch the communication path when a line fails.
  A "-" (hyphen) is displayed when the port mode is "CA".

- REC Transfer Mode
  Whether the REC synchronous transfer mode, the REC asynchronous stack mode, the REC asynchronous consistency mode, or the REC asynchronous through mode is enabled or disabled for the target port is displayed.
  A "-" (hyphen) is displayed when the port mode is "CA".
  - Sync
    When the REC synchronous transfer mode is enabled, the target port can be used as an REC synchronous transfer mode path.
  - Async Stack
    When the REC asynchronous stack mode is enabled, the target port can be used as an REC asynchronous stack mode path.
  - Async Consistency
    When the REC asynchronous consistency mode is enabled, the target port can be used as an REC asynchronous consistency mode path.
  - Async Through
    When the REC asynchronous through mode is enabled, the target port can be used as an REC asynchronous through mode path.

9.1.4.3 SAS Port

Parameters of the SAS ports that are registered in the ETERNUS DX Disk storage system are displayed.



The following items are displayed in the Main area:

- Port
  The location information of the target port is displayed.
  - CM#x CA#y Port#z (x: CM number, y: CA number, z: Port number)

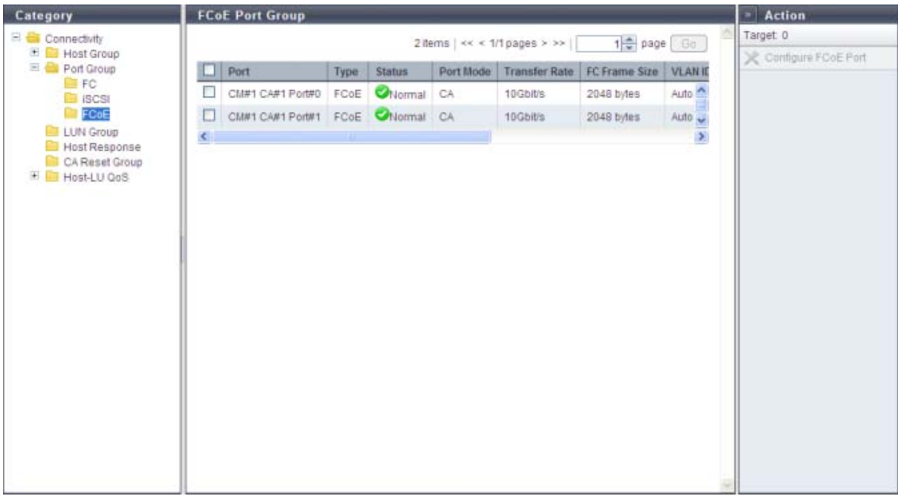
- Type
  The CA type (fixed at "SAS") of the target port is displayed.

- Status
  The status of the target port is displayed.

- Transfer Rate
  The transfer speed of the target port is displayed.
  - Auto-negotiation
  - 1.5 Gbit/s
  - 3 Gbit/s
  - 6 Gbit/s
- Reset Scope
  The reset scope of the target port is displayed.
  Reset scope is the range where the command reset from the server is performed, when the target port is connected to multiple servers.
  - I_T_L (I: Initiator, T: Target, L: LUN)
    Reset (cancel) the command request from the server that sent the command reset request.
  - T_L (T: Target, L: LUN)
    Reset (cancels) the command request from all of the servers that are connected to the port.
- Release Reservation if Chip is Reset
  Whether the function to release the reservation status of the volume when the target port (chip) is reset is enabled or disabled is displayed.

9.1.4.4 FCoE Port

Parameters of the FCoE ports that are registered in the ETERNUS DX Disk storage system are displayed.



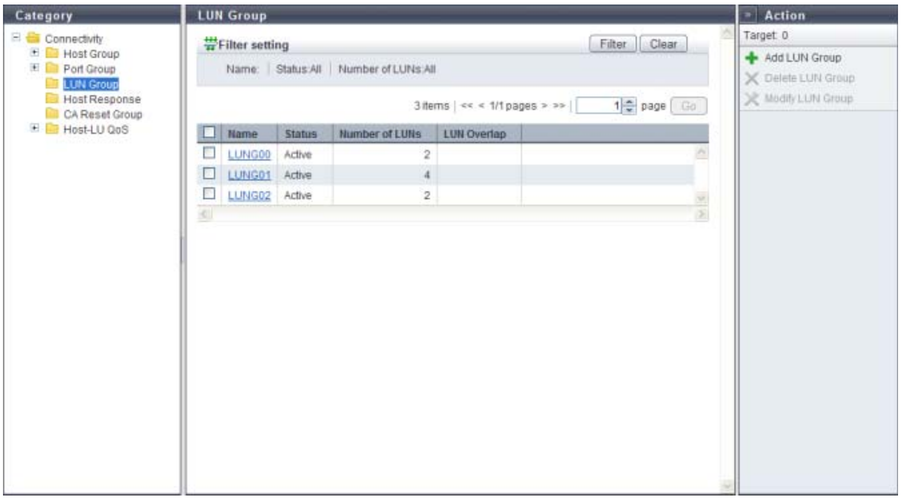
The following items are displayed in the Main area:

- Port
  The location information of the target port is displayed.
  - CM#x CA#y Port#z (x: CM number, y: CA number, z: Port number)
- Type
  The CA type (fixed at "FCoE") of the target port is displayed.
- Status
  The status of the target port is displayed.
- Port Mode
  The mode (fixed at "CA") of the target port is displayed.

- Transfer Rate
  The transfer speed (fixed at "10 Gbit/s") of the target port is displayed.
- FC Frame Size
  The frame size of the target port is displayed.
  "FC Frame Size" specifies the length of the communication information.
  - 512 bytes
  - 1024 bytes
  - 2048 bytes
- VLAN ID
  The VLAN ID of the target port is displayed.
- Fabric Name
  The fabric name of the target port is displayed.
- Reset Scope
  The reset scope of the target port is displayed.
  Reset scope is the range where the command reset from the server is performed, when the target port is connected to multiple servers.
  - I_T_L (I: Initiator, T: Target, L: LUN)
    Reset (cancel) the command request from the server that sent the command reset request.
  - T_L (T: Target, L: LUN)
    Reset (cancels) the command request from all of the servers that are connected to the port.
- Release Reservation if Chip is Reset
  Whether the function to release the reservation status of the volume when the target port (chip) is reset is enabled or disabled is displayed.

9.1.5 LUN Group

A list of the LUN groups is displayed.
A LUN group is a group of LUNs, which can be recognized by the host. The allocation information of LUNs and volumes in the ETERNUS DX Disk storage system are configured to the LUN group.



The following items are displayed in the Main area:

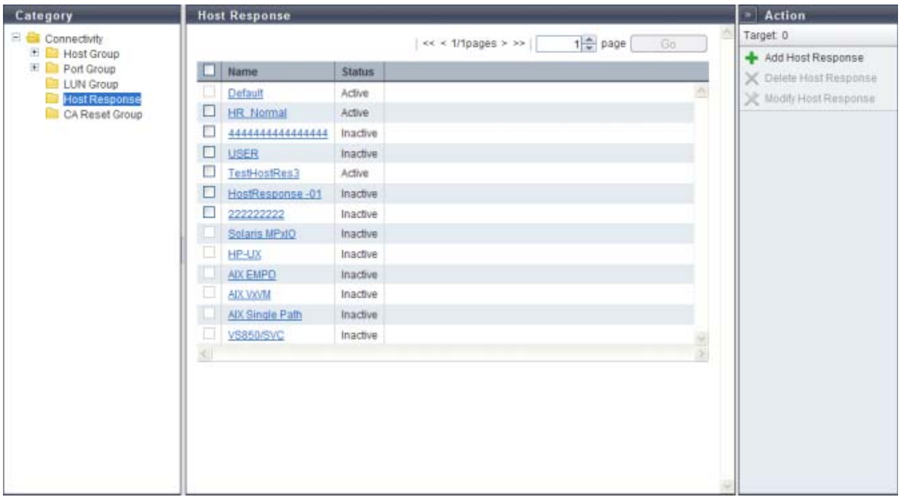
- Name
  The LUN group name is displayed. By clicking this item, the [LUN Group Detail] screen is displayed. Refer to "9.1.11 LUN Group Detail" (page 405) for display items.
- Status
  Whether the LUN group is used ("Active") or not ("Inactive") for the host affinity settings is displayed. "Host Affinity Setting" is to specify association between "Host Group", "CA Port Group", and "LUN Group" or association between "Host", "CA Port", "and "LUN Group".
  - Active
    The LUN group is used for the host affinity settings. The LUN group can be accessed from the host.
  - Inactive
    The LUN group is not used for the host affinity settings.
- Number of LUNs
  The number of LUNs, which have been allocated to volumes in the LUN group, is displayed.
- LUN Overlap
  If volumes in the LUN group satisfy one or both of the following conditions, "Yes" is displayed. For any other conditions, the field is blank.
  - The volumes are allocated to different LUN groups.
  - The volumes are included in the mapping information, which is directly allocated to the CA port without specifying the host group or the CA port group.

Filter setting

Filter	Description
Name	Input the LUN group name that is to be displayed. When not using the LUN group name for filtering, leave this item blank.
Status	Select the LUN group status that is to be displayed.
Number of LUNs	Select the number of LUNs that is to be displayed. Using "512LUN" as the standard, ">512" or "≤512" can be selected.

9.1.6 Host Response

The registered host responses are displayed.
The host response configures the appropriate operation mode on which the host makes connection. The usual host connection uses a recommended pattern or the default setting which have been arranged in advance in accordance with each OS type.
When customizing the host response in accordance with the OS type or the operating environment, refer to "9.2.5.1 Add Host Response" (page 581).



The following items are displayed in the Main area:

- Name
  All of the host responses, which have been registered in the ETERNUS DX Disk storage system, are displayed.
  - Solaris MPxIO
  - HP-UX
  - AIX EMPD (*1)
  - AIX VxVM
  - AIX Single Path
  - VS850/SVC
  - Host responses created in the ETERNUS DX Disk storage system
  - Default

  *1: EMPD: ETERNUS Multipath Driver

Caution

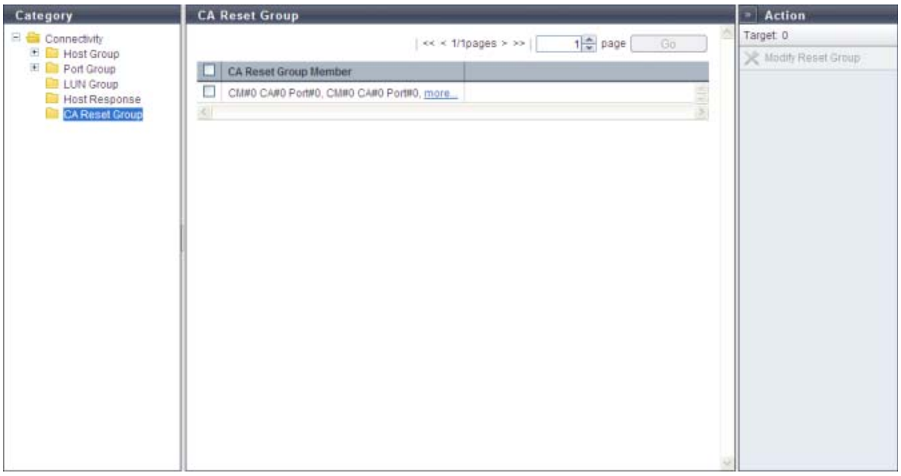
The following modifications are applied for the host response settings with firmware version V10L15 or later.

- "Others" is changed to "Default".
- "Windows EMPD", "Linux EMPD", and "Solaris EMPD" are deleted from the "Host Response" value. However, these parameters are displayed if they are applied for host groups.
- The setting parameters for "Windows EMPD", "Linux EMPD", and "Solaris EMPD" are the same as "Default".

- Status
  Whether the host response is used ("Active") or not ("Inactive") for the host affinity settings is displayed.
  - Active
    The host response is used for the host affinity settings.
  - Inactive
    The host response is not used for the host affinity settings.

9.1.7 CA Reset Group

A list of the registered CA reset groups is displayed.
A "CA reset group" is a group of ports which are released simultaneously under the instruction of a server.



The following items are displayed in the Main area:

- CA Reset Group Member
  The location information of member ports of each CA reset group is displayed.
  If there are several ports, the ports are displayed, being separated with a ", (comma)". If there are three or more ports the [more...] link are displayed.
  - CM#x CA#y Port#z (x: CM number, y: CA number, z: Port number)

9.1.8 Host-LU QoS

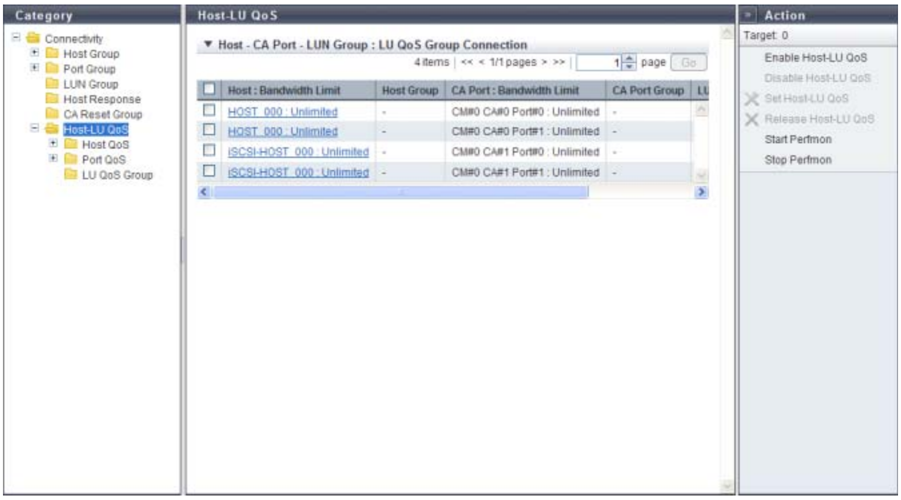
A list of the registered Host-LU QoS groups is displayed.
The Host-LU QoS list shows the association between "Host", "CA Port", and "LUN Group", bandwidth limit (performance limits), and performance information.

Caution

- When using GUI, schedule settings for QoS parameters and displaying scheduled QoS parameters are not available. Use CLI to check the scheduled QoS parameters that are specified using CLI. GUI displays only the bandwidth limit and the performance information that are specified by using GUI.
- Host-LU QoS does not support from LUN#1024 onward. If volumes are mapped from LUN#1024 onward, only the first 1024 LUNs (LUN#0 - LUN#1023) are displayed.

Note

- The operation status of Host-LU QoS can be confirmed with the displayed action name.
  - If [Enable Host-LU QoS] is displayed, the Host-LU QoS has been disabled. Host-LU QoS is not running.
  - If [Disable Host-LU QoS] is displayed, the Host-LU QoS has been enabled. Host-LU QoS is running.
- Host-LU QoS starts its operation by configuring the bandwidth limit on a "Host", "CA Port", or "LUN Group", and enabling the Host-LU QoS.
- This function displays the performance information that is obtained during performance monitoring regardless of whether the Host-LU QoS mode is enabled or disabled. When the performance information is displayed before performance monitoring is stopped, the performance information that was obtained up to this point is displayed. This function displays the total performance information for the host and the performance information for each host LUN.
- The performance information of each CA port can also be displayed. Refer to "9.1.8.5 Port QoS (Basic)" (page 396) for details.



The following items are displayed in the Main area:

- Host : Bandwidth Limit
  - Host
    The host name for which the host affinity setting is configured is displayed.
    If "All" is displayed, all of the hosts can access the ETERNUS DX Disk storage system.
  - Bandwidth Limit
    The maximum performance is displayed in IOPS (throughput value). If the bandwidth limit has not been configured (the bandwidth has not been limited), "Unlimited" is displayed.
    If "All" has been selected for hosts, a "-" (hyphen) is displayed.

  Click the [Host : Bandwidth Limit] link to display the total performance information for the host and the performance information of each LUN. Refer to "9.1.13 Host-LU QoS Performance Information" (page 407) for details.

- Host Group
  If a host belongs to a host group, the host group name is displayed. If a host does not belongs to the host group, a "-" (hyphen) is displayed.
  If "All" is displayed, all of the hosts can access the ETERNUS DX Disk storage system.

- CA Port : Bandwidth Limit
  - CA Port
    The location information of the CA port with the host affinity setting is displayed.
  - Bandwidth Limit
    The maximum performance is displayed in IOPS (throughput value). If the bandwidth limit has not been configured (the bandwidth has not been limited), "Unlimited" is displayed.

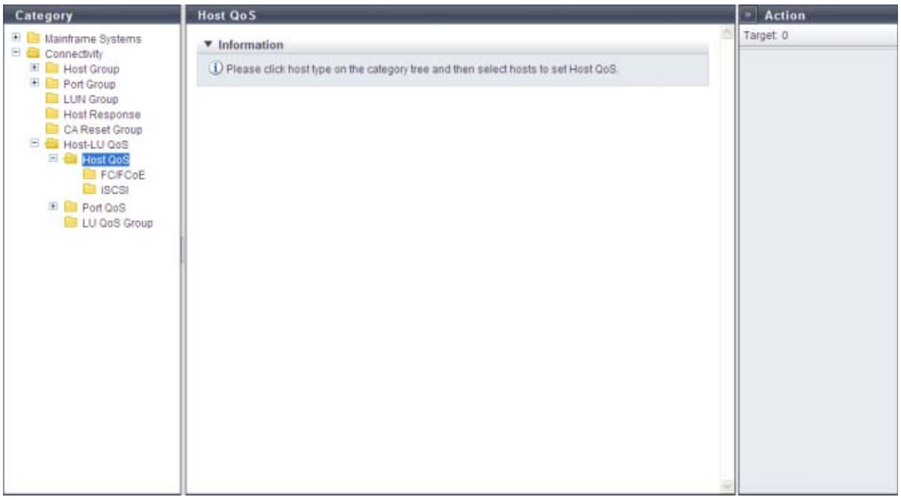
- CA Port Group
  If a CA port belongs to a CA port group, the CA port group name is displayed. If a host does not belong to a CA port group, a "-" (hyphen) is displayed.

- LUN Group : LU QoS Group
  - LUN Group
    The LUN group name is displayed. If the CLI command ("set mapping") is used for LUN mapping, a "- " (hyphen) is displayed.
  - LU QoS Group
    The LU QoS group number is displayed. If a LU QoS group number is not configured, a "- " (hyphen) is displayed.
    - For ETERNUS DX80 S2/DX90 S2/DX410 S2/DX440 S2/DX8100 S2: 0 - 543
    - For ETERNUS DX8700 S2: 0 - 2175

  Click the [LUN Group : LU QoS Group] link to display a bandwidth limit on each LUN. Refer to "9.1.12 LUN Group : LU QoS Group Detail" (page 406) for details.

9.1.8.1 Host QoS (Basic)

Follow the message in the Information area to configure a bandwidth limit on each host.

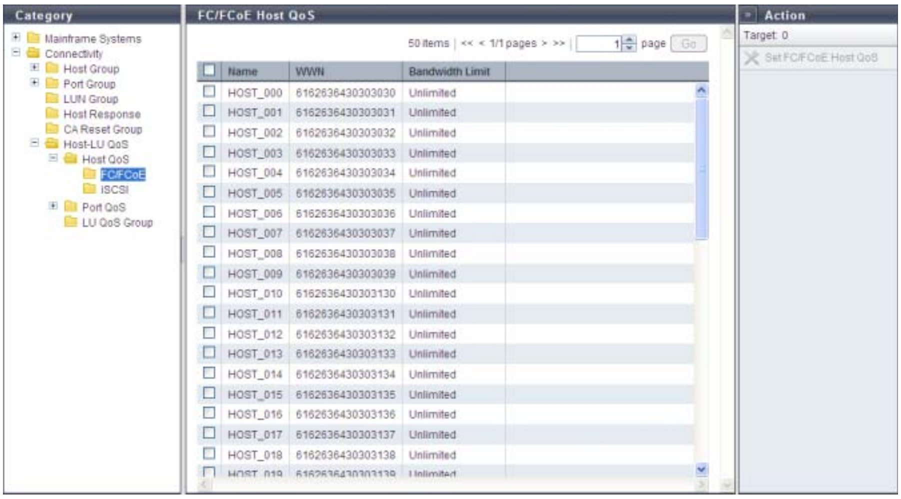


9.1.8.2 FC/FCoE Host QoS

The bandwidth limit of the FC/FCoE hosts that are registered in the ETERNUS DX Disk storage system is displayed.

Note

This function displays all the hosts that are registered in the ETERNUS DX Disk storage system regardless of whether the hosts belong to host groups or not.



The following items are displayed in the Main area:

- Name
  The FC/FCoE host name is displayed.

- WWN
  The FC/FCoE host WWN is displayed.

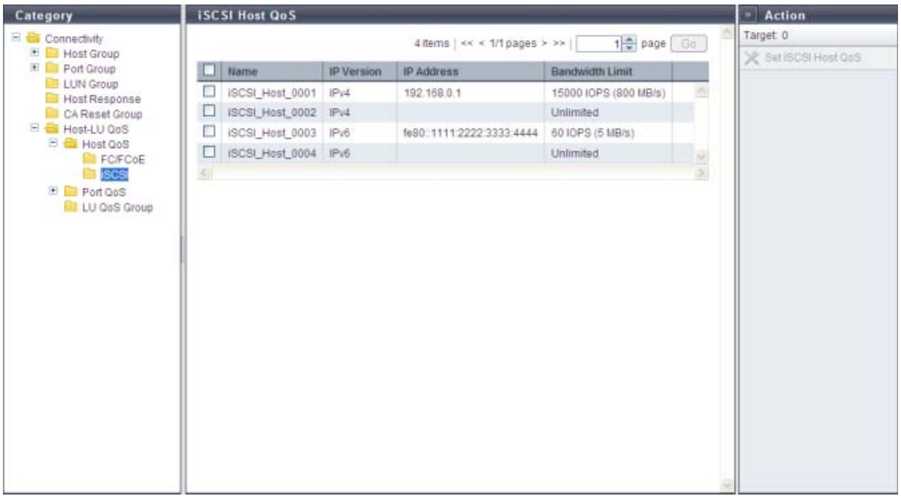
- Bandwidth Limit
  The maximum performance of the FC/FCoE host is displayed in IOPS (throughput value). If the bandwidth limit has not been configured (the bandwidth has not been limited), "Unlimited" is displayed.

9.1.8.3 iSCSI Host QoS

The bandwidth limit of the iSCSI hosts that are registered in the ETERNUS DX Disk storage system is displayed.

Note

This function displays all the hosts that are registered in the ETERNUS DX Disk storage system regardless of whether the hosts belong to host groups or not.



The following items are displayed in the Main area:

- Name
  The iSCSI host name is displayed.

- IP Version
  The IP version of the iSCSI host is displayed.

- IP Address
  The IP address of the iSCSI host is displayed.
  Note that the IPv6 address is displayed as an abbreviation. Refer to "IPv6 Address Notation" (page 378) for details.
  If the IP address is not set, the field is blank.

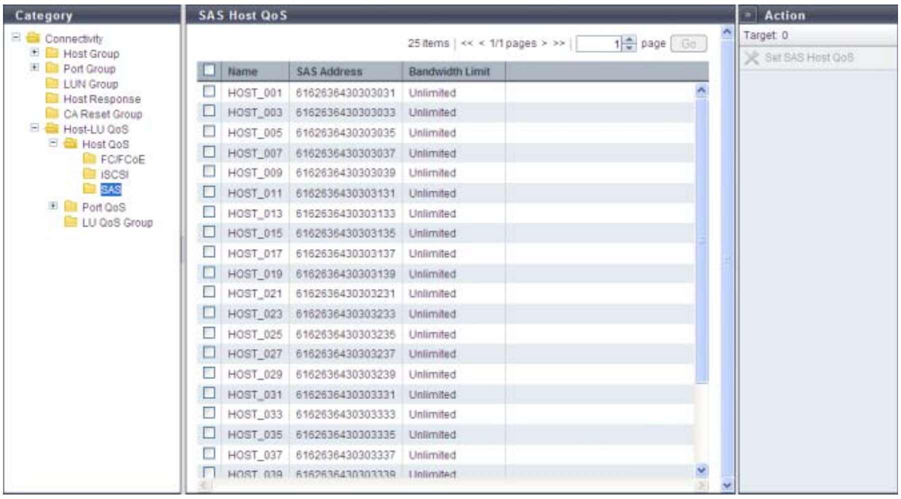
- Bandwidth Limit
  The maximum performance of the iSCSI host is displayed in IOPS (throughput value). If the bandwidth limit has not been configured (the bandwidth has not been limited), "Unlimited" is displayed.

9.1.8.4 SAS Host QoS

The bandwidth limit of the SAS hosts that are registered in the ETERNUS DX Disk storage system is displayed.

Note

This function displays all the hosts that are registered in the ETERNUS DX Disk storage system regardless of whether the hosts belong to host groups or not.



The following items are displayed in the Main area:

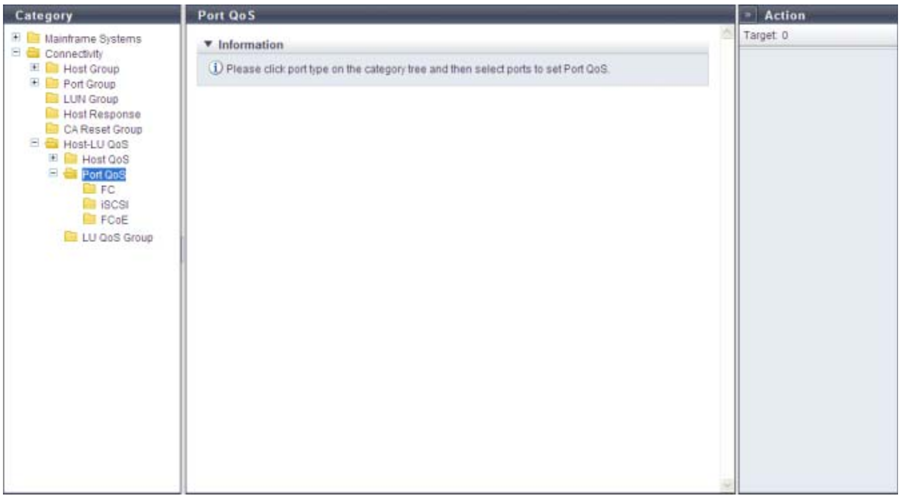
- Name
  The SAS host name is displayed.

- SAS address
  The SAS address of the SAS host is displayed.

- Bandwidth Limit
  The maximum performance of the SAS host is displayed in IOPS (throughput value). If the bandwidth limit has not been configured (the bandwidth has not been limited), "Unlimited" is displayed.

9.1.8.5 Port QoS (Basic)

Follow the message in the Information area to configure a bandwidth limit on each port.

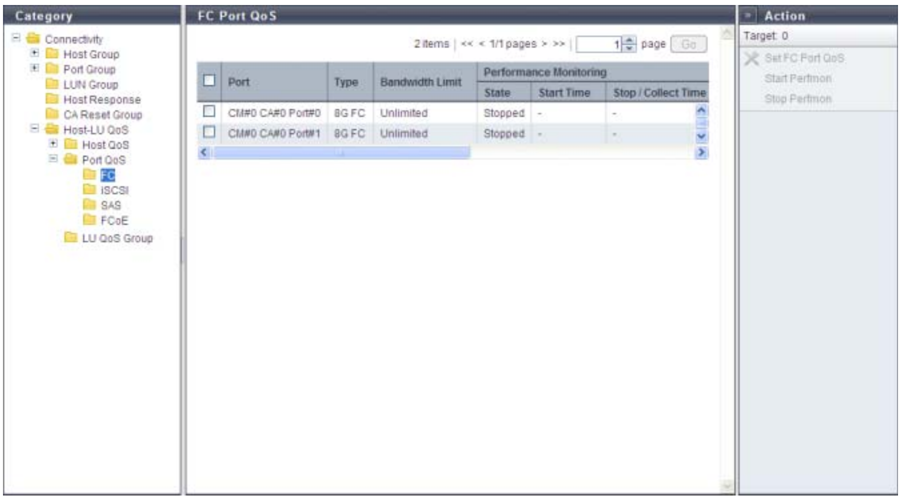


9.1.8.6 FC Port QoS

This function displays the bandwidth limit and the performance information of the FC ports that are registered in the ETERNUS DX Disk storage system.

Note

- The ports with "CA" or "CA/RA" as the port mode that are registered by the ETERNUS DX Disk storage system are displayed regardless of whether the ports belong to CA port groups or not.
- This function displays the performance information that is obtained during performance monitoring regardless of whether the Host-LU QoS mode is enabled or disabled. When the performance information is displayed before performance monitoring is stopped, the performance information that was obtained up to this point is displayed. This function displays the performance information of each port.



The following items are displayed in the Main area:

- Port
  The location information of the target port is displayed.

- Type
  The type of the target port is displayed.
  - 8G FC
    An 8Gbit/s (maximum) FC.
  - 16G FC
    A 16Gbit/s (maximum) FC.

- Bandwidth Limit
  The maximum performance of the target port is displayed in IOPS (throughput value). If the bandwidth limit has not been configured (the bandwidth has not been limited), "Unlimited" is displayed.

- Performance Monitoring
  - State
    The status of performance monitoring for the host is displayed.
    - Active
    - Stopped
  - Start Time
  - Stop / Collect Time
    The start time and the end time for performance monitoring are displayed.
    - YYYY-MM-DD hh:mm:ss (YYYY: Year (AD), MM: Month (01 - 12), DD: Day (01 - 31), hh: Hour (00 - 23), mm: Minute (00 - 59), ss: Second (00 - 59))

    The displayed time varies depending on how the performance monitoring is started or ended.
    - Before monitoring is started (*1)
      "State" for performance monitoring is "Stopped". "-" (hyphens) are displayed for "Start Time" and "Stop Collect Time".
    - Monitoring is started
      "State" for performance monitoring is changed from "Stopped" to "Active". The time when performance monitoring was started is displayed for "Start Time". The time when the performance information is obtained is displayed for "Stop / Collect Time".
    - Monitoring is started while the monitoring session has already been started
      "State" for performance monitoring is "Active". The last time when performance monitoring was started is displayed for "Start Time". The time when the performance information is obtained is displayed for "Stop / Collect Time".
    - Monitoring is stopped
      "State" for performance monitoring is changed from "Active" to "Stopped". The last time when performance monitoring was started is displayed for "Start Time". The time when performance monitoring is stopped is displayed for "Stop / Collect Time".
    - Monitoring is stopped while the monitoring session has already been stopped
      "State" for performance monitoring is "Stopped". The last time when performance monitoring was started is displayed for "Start Time". The first time when performance monitoring was stopped is displayed for "Stop / Collect Time".

      *1: When performance monitoring is not being performed after the ETERNUS DX Disk storage system is started. When the start time is "0", "-" is displayed for "Start Time" and "Stop / Collect Time".

    When the start time is "0", "-" is displayed for "Start Time" and "Stop / Collect Time".

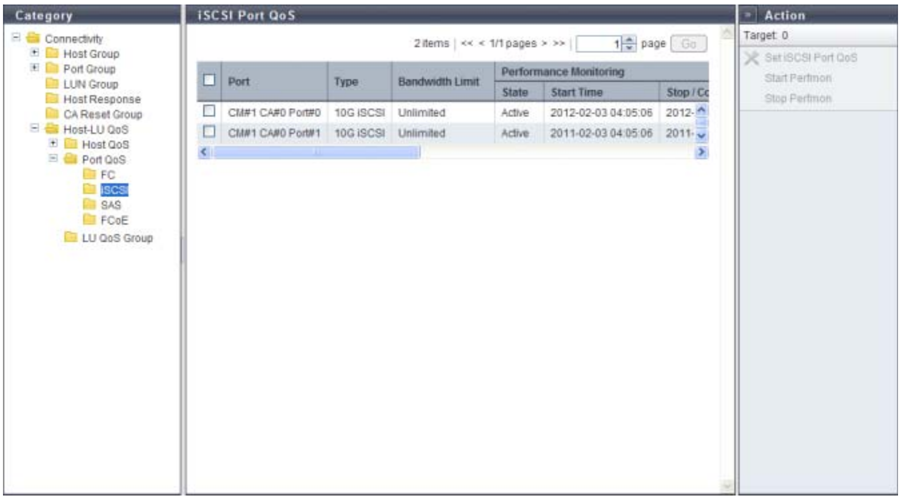
> **Caution**
>
> If performance monitoring is restarted during an active performance monitoring session, the performance information that is already obtained is deleted and the collection of performance information starts again.

- IOPS
  The performance information from when performance monitoring is started until performance monitoring is ended (or performance information is displayed) is displayed.
  - Ave
    The average I/O count per second is displayed.
  - Min
    The minimum I/O count per second is displayed.
  - Max
    The maximum I/O count per second is displayed.
- Throughput
  The transfer data size from when performance monitoring is started until performance monitoring is ended (or performance information is displayed) is displayed.
  - Ave
    The average data transfer size per second is displayed.
  - Min
    The minimum data transfer size per second is displayed.
  - Max
    The maximum data transfer size per second is displayed.
- Delay Time
  - Total
    The total delay time for executing a command from when performance monitoring is started until performance monitoring is ended (or performance information is displayed) is displayed. If the total delay time exceeds the maximum value, "Overflow" is displayed.
  - Ave
    The average delay time per command from when performance monitoring is started until performance monitoring is ended (or performance information is displayed) is displayed.

9.1.8.7 iSCSI Port QoS

This function displays the bandwidth limit and the performance information of the iSCSI ports that are registered in the ETERNUS DX Disk storage system.

> **Note**
>
> - The ports with "CA" or "CA/RA" as the port mode that are registered by the ETERNUS DX Disk storage system are displayed regardless of whether the ports belong to CA port groups or not.
> - This function displays the performance information that is obtained during performance monitoring regardless of whether the Host-LU QoS mode is enabled or disabled. When the performance information is displayed before performance monitoring is stopped, the performance information that was obtained up to this point is displayed. This function displays the performance information of each port.



The following items are displayed in the Main area:

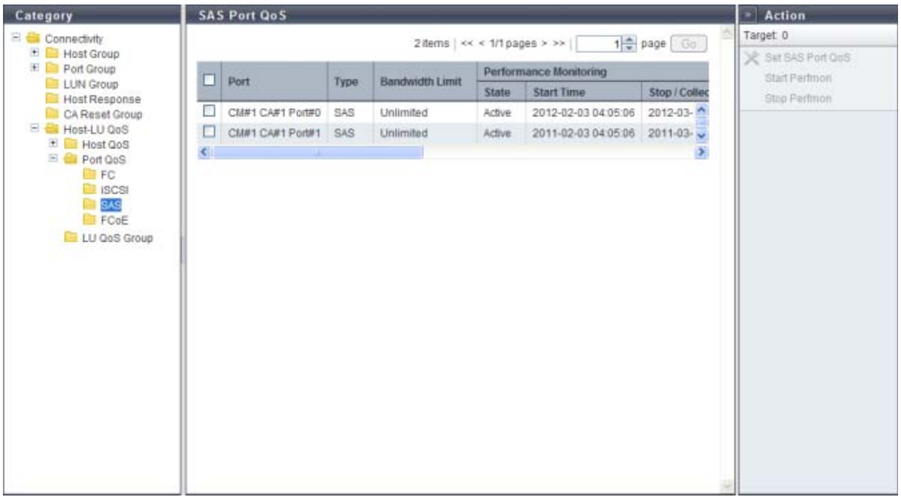
- Port
  The location information of the target port is displayed.
- Type
  The type of the target port is displayed.
  - 1G iSCSI
    1Gbit/s iSCSI.
  - 10G iSCSI
    10Gbit/s iSCSI.
- Bandwidth Limit
  The maximum performance of the target port is displayed in IOPS (throughput value). If the bandwidth limit has not been configured (the bandwidth has not been limited), "Unlimited" is displayed.
- Performance Monitoring
  Refer to "Performance Monitoring" (page 397) for details.
- IOPS
  Refer to "Performance Monitoring" (page 397) for details.
- Throughput
  Refer to "Performance Monitoring" (page 397) for details.
- Delay Time
  Refer to "Performance Monitoring" (page 397) for details.

9.1.8.8 SAS Port QoS

This function displays the bandwidth limit and the performance information of the SAS ports that are registered in the ETERNUS DX Disk storage system.

Note

- The ports that are registered by the ETERNUS DX Disk storage system are displayed regardless of whether the ports belong to CA port groups or not.
- This function displays the performance information that is obtained during performance monitoring regardless of whether the Host-LU QoS mode is enabled or disabled. When the performance information is displayed before performance monitoring is stopped, the performance information that was obtained up to this point is displayed. This function displays the performance information of each port.



The following items are displayed in the Main area:

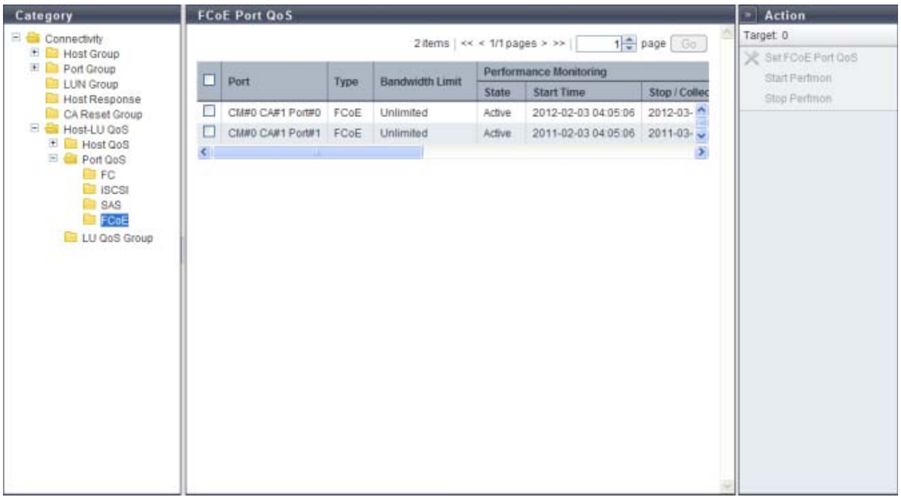
- Port
  The location information of the target port is displayed.
- Type
  The type of the target port is displayed.
- Bandwidth Limit
  The maximum performance of the target port is displayed in IOPS (throughput value). If the bandwidth limit has not been configured (the bandwidth has not been limited), "Unlimited" is displayed.
- Performance Monitoring
  Refer to "Performance Monitoring" (page 397) for details.
- IOPS
  Refer to "Performance Monitoring" (page 397) for details.
- Throughput
  Refer to "Performance Monitoring" (page 397) for details.
- Delay Time
  Refer to "Performance Monitoring" (page 397) for details.

9.1.8.9 FCoE Port QoS

This function displays the bandwidth limit and the performance information of the FCoE ports that are registered in the ETERNUS DX Disk storage system.

Note

- The ports that are registered by the ETERNUS DX Disk storage system are displayed regardless of whether the ports belong to CA port groups or not.
- This function displays the performance information that is obtained during performance monitoring regardless of whether the Host-LU QoS mode is enabled or disabled. When the performance information is displayed before performance monitoring is stopped, the performance information that was obtained up to this point is displayed. This function displays the performance information of each port.



The following items are displayed in the Main area:

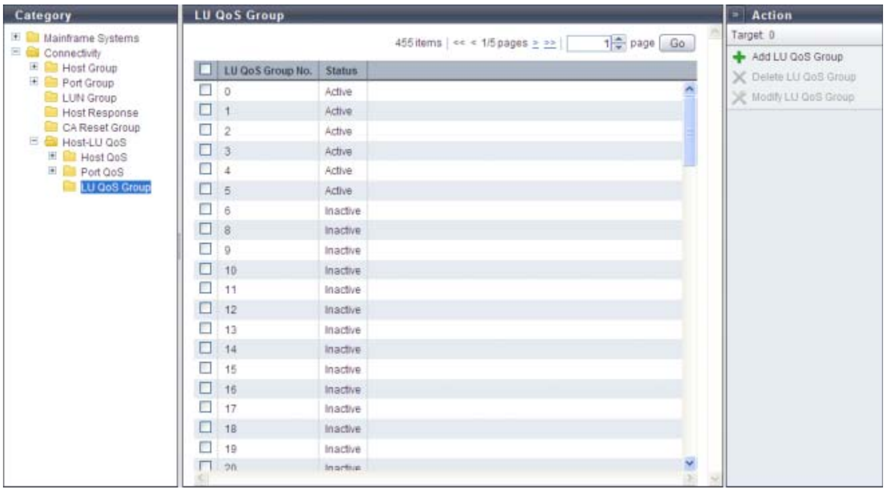
- Port
  The location information of the target port is displayed.
- Type
  The type of the target port is displayed.
- Bandwidth Limit
  The maximum performance of the target port is displayed in IOPS (throughput value). If the bandwidth limit has not been configured (the bandwidth has not been limited), "Unlimited" is displayed.
- Performance Monitoring
  Refer to "Performance Monitoring" (page 397) for details.
- IOPS
  Refer to "Performance Monitoring" (page 397) for details.
- Throughput
  Refer to "Performance Monitoring" (page 397) for details.
- Delay Time
  Refer to "Performance Monitoring" (page 397) for details.

9.1.8.10 LU QoS Group

A list of the registered LU QoS groups is displayed.
An LU QoS group is a group of the bandwidth limit (the maximum performance) configured for each Host LUN.

Note

By assigning an LU QoS group to a LUN group with the host affinity setting, the bandwidth limit can be configured for each LUN. Refer to "9.2.7.2 Set Host-LU QoS" (page 599) for details.

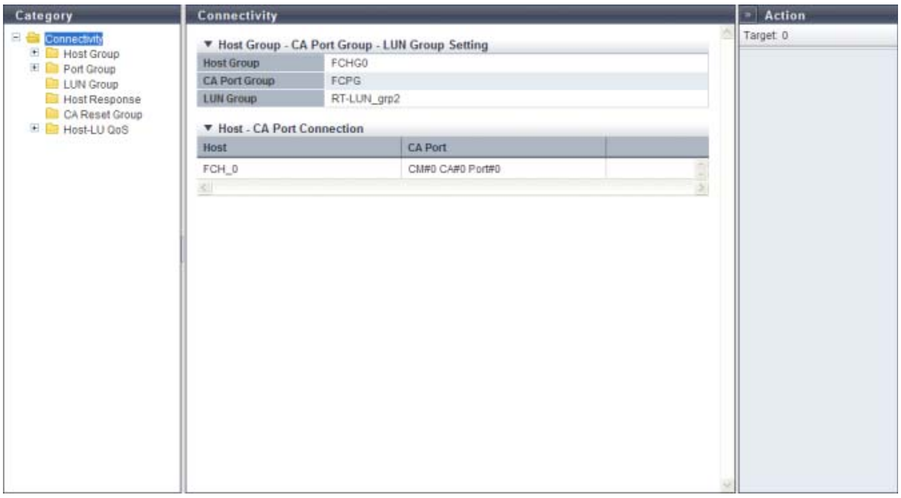


The following items are displayed in the Main area:

- LU QoS Group No.
  The LU QoS group number is displayed.
  - For ETERNUS DX80 S2/90 S2, ETERNUS DX410 S2/DX440 S2, ETERNUS DX8100 S2: 0 - 543
  - For ETERNUS DX8700 S2: 0 - 2175
- Status
  Whether a LU QoS group is assigned to a LUN group with the host affinity setting is displayed.
  "Host affinity setting" is to specify association between "Host", "CA Port" and "LUN Group".
  - Active
    The LU QoS group is assigned to a LUN group.
  - Inactive
    The LU QoS group is not assigned to a LUN group.

9.1.9 Host Affinity Detail

The details of the host affinity are displayed.



The following items are displayed in the Main area:

Host Group - CA Port Group - LUN Group Setting

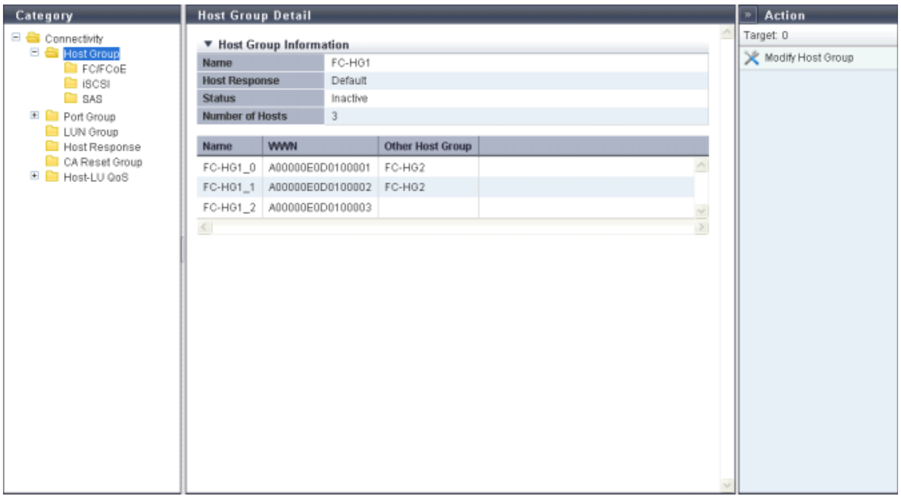
- Host Group
  The selected host group name or "All" is displayed.
- CA Port Group
  The CA port group that is allocated to the selected host group is displayed.
- LUN Group
  The LUN group that is allocated to the selected host group is displayed.

Host - CA Port Connection

- Host
  Member hosts in the selected host group is displayed.
  If "All" has been selected for the host group, "All" is also displayed for the host.
- CA Port
  The location information of the CA port which has the host affinity setting with the relevant host is displayed.

9.1.10 Host Group Detail

The details of the host group are displayed.



The following items are displayed in the Main area:

- Host Group Information

  - Name
    The host group name is displayed.

  - Host Response
    The host response name, which has been assigned to a host group, is displayed.

  - Status
    Whether the host group is "Active" or "Inactive" in the host affinity setting is displayed.

  - Number of Hosts
    The number of hosts, which have been registered in the host group, is displayed.

- Host List

  - Name
    The host name is displayed.

  - WWN
    When the host interface type is "FC/FCoE", the WWN of the host is displayed.

  - iSCSI Name
    When the host interface type is "iSCSI", the iSCSI name of the host is displayed.

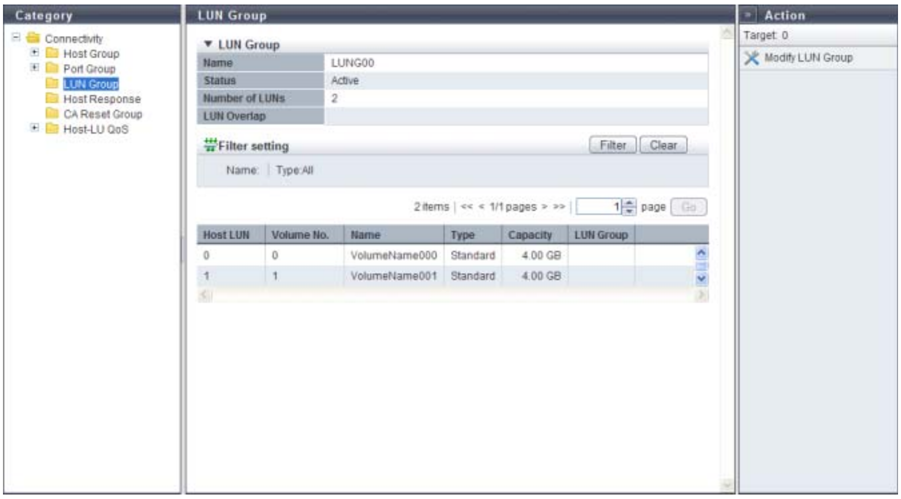
  - SAS Address
    When the host interface type is "SAS", the SAS address of the host is displayed.

  - Other Host Group
    The other host group names to which the host belongs are displayed.

    When the host belongs to two host groups, the host group names are separated with a ", (comma)" and displayed. If the host belongs to three or more host groups, the names of the first two groups and a [more...] link are displayed. If the host belongs to only one host group, the field is blank.

9.1.11 LUN Group Detail

The detailed information of a LUN group is displayed.



The following items are displayed in the Main area:

- Host LUN
  The host LUN is displayed.

- Volume No.
  The volume number, which is allocated to the LUN, is displayed.

- Name
  The volume name is displayed.

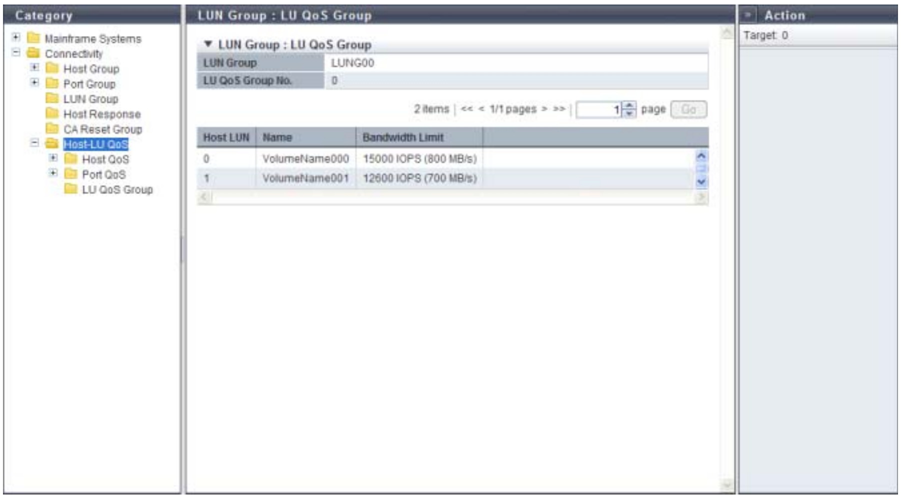
- Type
  The volume type is displayed.
  - Standard
  - WSV
  - TPV
  - FTV
  - SDV

- Capacity
  The volume capacity is displayed.
  When the "Type" is "SDV", the logical capacity, which can be accessed from the host, is displayed.

- LUN Group
  If the volume is allocated to different LUN groups, the LUN group name is displayed. If the host, ports, and LUNs are associated without specifying a host group or CA port group, the location information of the ports is displayed.
  If the volume is registered in multiple LUN groups or the volume is allocated to multiple ports, the display contents vary depending on the number of LUN groups and the number of ports. When there are two display targets (the LUN group name and the port location information), the items are separated with a ", (comma)" and displayed. When there are three or more display targets (the LUN group name and the port location information), the first two items and a [more...] link are displayed. When a volume is not allocated to different LUN groups, the field is blank.

9.1.12 LUN Group : LU QoS Group Detail

The bandwidth limit for each LUN is displayed.



The following items are displayed in the Main area:

- LUN Group
  The LUN group name is displayed. If the CLI command ("set mapping") is used for LUN mapping, a "-" (hyphen) is displayed.

- LU QoS Group No.
  The LU QoS group number is displayed. If a LU QoS group number is not configured, a "-" (hyphen) is displayed.
  - For ETERNUS DX80 S2/DX90 S2/DX410 S2/DX440 S2/DX8100 S2: 0 - 543
  - For ETERNUS DX8700 S2: 0 - 2175

- Host LUN
  The host LUN number is displayed.

- Name
  The volume name is displayed.

- Bandwidth Limit
  The maximum performance is displayed in IOPS (throughput value). If the bandwidth limit has not been configured (the bandwidth has not been limited), "Unlimited" is displayed.

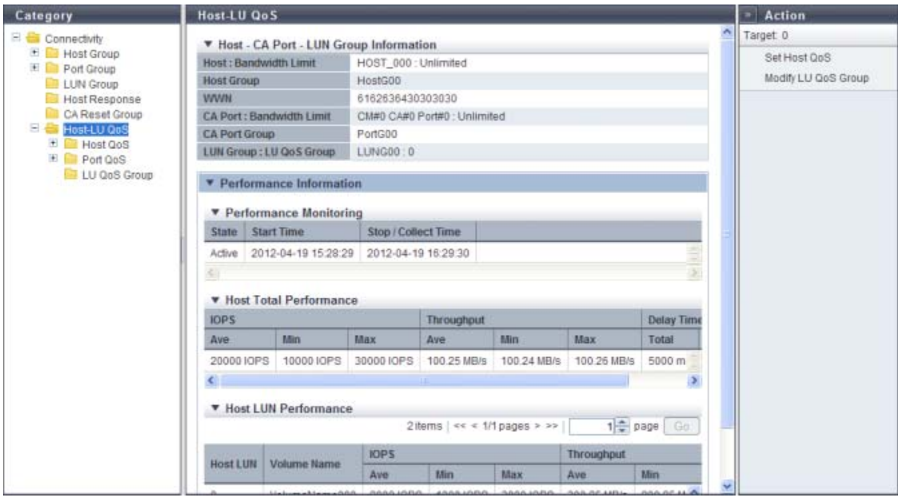
9.1.13 Host-LU QoS Performance Information

When a host affinity setting with a specific host group is already configured, the total performance information for the host and the performance information of each LUN are displayed.
If a host affinity setting with all of the host groups is configured ("All" is specified as the target host group), the performance information of each host LUN is displayed.

Caution

The monitoring status of the performance information and obtained performance information are cleared in the following conditions:

- When the port mode is changed (CA, CA/RA → RA or Initiator)
- When the ETERNUS DX Disk storage system is rebooted
- When an error is detected in the ETERNUS DX Disk storage system
- When the hot maintenance of the CM is performed
- When the concurrent firmware upgrade is being performed in the ETERNUS DX Disk storage system



The following items are displayed in the Main area:

● Host - CA Port - LUN Group Information

- Host : Bandwidth Limit
  The host name and the bandwidth limit of the selected host is displayed in "Host : Bandwidth Limit" format.
  If the bandwidth limit has not been configured (the bandwidth has not been limited), "Unlimited" is displayed as the "Bandwidth Limit". If "All" has been selected for the host, a "-" (hyphen) is displayed as the "Bandwidth Limit".

- Host Group
  The host group name, to which the selected host belongs, is displayed.
  If all of the hosts are to be connected, "All" is displayed.
  If the host does not belong to a host group, a "-" (hyphen) is displayed.

- WWN
  The WWN for the selected host is displayed.
  This item is displayed when the host affinity setting is configured and the selected host is "FC" or "FCoE".

- iSCSI Name
  The iSCSI name for the selected host is displayed.
  This item is displayed when the host affinity setting is configured and the selected host is "iSCSI".

- IP Version
  The IP version of the iSCSI host is displayed. This item is displayed when the host affinity setting is configured and the selected host is "iSCSI".
  - IPv4
  - IPv6

- IP Address
  The IP address of the selected iSCSI host is displayed.
  Note that the IPv6 address is displayed as an abbreviation. If the IP address is not specified, the field is blank.
  This item is displayed when the host affinity setting is configured and the selected host is "iSCSI".
  - For IPv4 address
    - xxx.xxx.xxx.xxx
      xxx: 0 - 255 for other fields (decimal)
  - For IPv6 address
    - xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
      xxxx: 0 - ffff (hexadecimal, "a" - "f" are lowercase letters)
      Refer to "IPv6 Address Notation" (page 378) for details.

- SAS Address
  The SAS address of the selected host is displayed.
  This item is displayed when the host affinity setting is configured and the selected host is "SAS".

- CA Port : Bandwidth Limit
  The location information and the bandwidth limit of the selected CA port is displayed in "CA Port : Bandwidth Limit" format.
  If the bandwidth limit has not been configured (the bandwidth has not been limited), "Unlimited" is displayed as the "Bandwidth Limit".

- CA Port Group
  If a CA port that is connected to the selected host belongs to a CA port group as a member, the CA port group name is displayed. If a host does not belong as a member, a "-" (hyphen) is displayed.

- LUN Group : LU QoS Group
  The LUN group name and LU QoS group number are displayed in "LUN Group : LU QoS Group" format.
  If the CLI command ("set mapping") is used for LUN mapping, a "-" (hyphen) is displayed as "LUN Group".
  If a LUN QoS group number has not been configured, a "- " (hyphen) is displayed as "LU QoS Group".
  - LU QoS group
    ETERNUS DX80 S2/90 S2/410 S2/440/8100 S2 S2: 0 - 543
    ETERNUS DX8700 S2: 0 - 2175

Performance information

- Login IP Address
  IP address that is logged in is displayed.
  The performance information is displayed for each specified IP address. Note that the IPv6 address is displayed as an abbreviation. If there is no IP address, a "-" (hyphen) is displayed.
  This item is displayed for the iSCSI host when the host affinity setting is configured, the iSCSI name is specified, and the IP address is not specified.
  - For IPv4 address
    - xxx.xxx.xxx.xxx
      xxx: 0 - 255 for other fields (decimal)
  - For IPv6 address
    - xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
      xxxx: 0 - ffff (hexadecimal, "a" - "f" are lowercase letters)
      Refer to "IPv6 Address Notation" (page 378) for details.

Performance Monitoring

- State
  The status of performance monitoring for the host is displayed.
  - Active
  - Stopped
- Start Time
- Stop / Collect Time
  The start time and the end time for performance monitoring are displayed.
  The displayed time varies depending on how the performance monitoring is started or ended.
  - Before monitoring is started (*1)
    "State" for performance monitoring is "Stopped". "-" (hyphens) are displayed for "Start Time" and "Stop Collect Time".
  - Monitoring is started
    "State" for performance monitoring is changed from "Stopped" to "Active". The time when performance monitoring was started is displayed for "Start Time". The time when the performance information is obtained is displayed for "Stop / Collect Time".
  - Monitoring is started while the monitoring session has already been started
    "State" for performance monitoring is "Active". The last time when performance monitoring was started is displayed for "Start Time". The time when the performance information is obtained is displayed for "Stop / Collect Time".
  - Monitoring is stopped
    "State" for performance monitoring is changed from "Active" to "Stopped". The last time when performance monitoring was started is displayed for "Start Time". The time when performance monitoring is stopped is displayed for "Stop / Collect Time".
  - Monitoring is stopped while the monitoring session has already been stopped
    "State" for performance monitoring is "Stopped". The last time when performance monitoring was started is displayed for "Start Time". The first time when performance monitoring was stopped is displayed for "Stop / Collect Time".

  *1: When performance monitoring is not being performed after the ETERNUS DX Disk storage system is started.

  In the following conditions, "-" (hyphens) are displayed for "Start Time" and "Stop / Collect Time".
  - When no iSCSI host with the host affinity setting is connected
  - When no IP address for an iSCSI host with the host affinity setting is logged in
  - When the start time is "0"

Caution

If performance monitoring is restarted during an active performance monitoring session, the performance information that is already obtained is deleted and the collection of performance information starts again.

- Host Total Performance

When the host affinity setting is configured by a port and a specific host group, the total performance information for the specific host that is connected to the port is displayed.
If an IP address is not specified and multiple IP addresses are logged in with the iSCSI host that is connected to the target port, the performance information of each IP address is displayed.

- IOPS
  The performance information from when performance monitoring is started until performance monitoring is ended (or performance information is displayed) is displayed.
  - Ave
    The average I/O count per second is displayed.
  - Min
    The minimum I/O count per second is displayed.
  - Max
    The maximum I/O count per second is displayed.
- Throughput
  The transfer data size from when performance monitoring is started until performance monitoring is ended (or performance information is displayed) is displayed.
  - Ave
    The average data transfer size per second is displayed.
  - Min
    The minimum data transfer size per second is displayed.
  - Max
    The maximum data transfer size per second is displayed.
- Delay Time
  - Total
    The total delay time for executing a command from when performance monitoring is started until performance monitoring is ended (or performance information is displayed) is displayed. If the total delay time exceeds the maximum value, "Overflow" is displayed.
  - Ave
    The average delay time per command from when performance monitoring is started until performance monitoring is ended (or performance information is displayed) is displayed.

● Host LUN Performance

The performance information of each LUN is displayed for the specific host (when "All" is specified for the host, all of the hosts) that is connected to the port.

- Host LUN
  The host LUN is displayed.
  - 0 - 1023
- Volume Name
  The volume name is displayed.
- IOPS
  The performance information from when performance monitoring is started until performance monitoring is ended (or performance information is displayed) is displayed.
  - Ave
    The average I/O count per second is displayed.
  - Min
    The minimum I/O count per second is displayed.
  - Max
    The maximum I/O count per second is displayed.
- Throughput
  The transfer data size from when performance monitoring is started until performance monitoring is ended (or performance information is displayed) is displayed.
  - Ave
    The average data transfer size per second is displayed.
  - Min
    The minimum data transfer size per second is displayed.
  - Max
    The maximum data transfer size per second is displayed.
- Delay Time
  - Total
    The total delay time for executing a command from when performance monitoring is started until performance monitoring is ended (or performance information is displayed) is displayed. If the total delay time exceeds the maximum value, "Overflow" is displayed.
  - Ave
    The average delay time per command from when performance monitoring is started until performance monitoring is ended (or performance information is displayed) is displayed.

9.2 Functions in the Action Area for Connectivity

When using functions in the Action area, select the desired function from the Action area that is displayed in the status display screen.
The functions in the Action area for Connectivity can be performed from the following display functions:

Functions in the Action area for Connectivity	Display function
Host Affinity Management	–
Create Host Affinity	• Connectivity (Basic Information) • Host Group
Delete Host Affinity	• Connectivity (Basic Information)
Modify Host Affinity	
Hot Group Management	–
Add FC/FCoE Host Group	• Connectivity (Basic Information) • Host Group • FC/FCoE Host in Host Group
Add iSCSI Host Group	• Connectivity (Basic Information) • Host Group • iSCSI Host in Host Group
Add SAS Host Group	• Connectivity (Basic Information) • Host Group • SAS Host in Host Group
Add FC/FCoE Host	• Connectivity (Basic Information) • FC/FCoE Host in Host Group
Add iSCSI Host	• Connectivity (Basic Information) • iSCSI Host in Host Group
Add SAS Host	• Connectivity (Basic Information) • SAS Host in Host Group
Delete Host Group	• Host Group
Modify Host Group	
Modify Host Group (FC/FCoE)	
Modify Host Group (iSCSI)	
Modify Host Group (SAS)	
Delete FC/FCoE Host	• FC/FCoE Host in Host Group
Delete iSCSI Host	• iSCSI Host in Host Group
Delete SAS Host	• SAS Host in Host Group
Modify FC/FCoE Host	• FC/FCoE Host in Host Group
Modify iSCSI Host	• iSCSI Host in Host Group
Modify SAS Host	• SAS Host in Host Group

Functions in the Action area for Connectivity		Display function
CA Port Group Management		–
	Create FC Port Group	• CA Port Group
	Create iSCSI Port Group	
	Create SAS Port Group	
	Create FCoE Port Group	
	Delete CA Port Group	
	Modify CA Port Group	
	Modify FC Port Parameters	• FC Port in Port Group
	Modify iSCSI Port Parameters	• iSCSI Port in Port Group
	Modify SAS Port Parameters	• SAS Port in Port Group
	Modify FCoE Port Parameters	• FCoE Port in Port Group
	Modify Port Mode	• FC Port in Port Group • iSCSI Port in Port Group
LUN Group Management		–
	Add LUN Group	• LUN Group
	Delete LUN Group	
	Modify LUN Group	
Host Response Management		–
	Add Host Response	• Host Response
	Delete Host Response	
	Modify Host Response	
Modify CA Reset Group		• CA Reset Group
Host-LU QoS Management		–
	Enable/Disable Host-LU QoS	• Host-LU QoS
	Set Host-LU QoS	
	Release Host-LU QoS	
	Start Host-LU QoS Performance Monitoring	
	Stop Host-LU QoS Performance Monitoring	
	Set FC/FCoE Host QoS	• FC/FCoE Host QoS in Host QoS
	Set iSCSI Host QoS	• iSCSI Host QoS in Host QoS
	Set SAS Host QoS	• SAS Host QoS in Host QoS
	Set FC Port QoS	• FC Port QoS in Host QoS
	Set iSCSI Port QoS	• iSCSI Port QoS in Host QoS
	Set SAS Port QoS	• SAS Port QoS in Host QoS
	Set FCoE Port QoS	• FCoE Port QoS in Host QoS
	Add LU QoS Group	• LU QoS Group
	Delete LU QoS Group	
	Modify LU QoS Group	

9.2.1 Host Affinity Management

Host Affinity management provides the following functions:

- Create Host Affinity
- Delete Host Affinity
- Modify Host Affinity

9.2.1.1 Create Host Affinity

This function creates a new host affinity.
When "Host Group - CA Port Group" is selected for "Target Connection", specify the existing "Host Group", "CA Port Group", and "LUN Group" settings. When "Host - CA Port" is selected for "Target Connection", select the existing "Host", "CA Port", "and "LUN Group" settings.
The host accesses a volume via a defined path. Configuring the host affinity can limit the volumes which the host can recognize.

- The maximum number of connectable hosts (the number of HBAs) per CA port is 256.

Caution

- If a host group has been specified in the "Host Group" field of host affinity, all the member ports of the assigned "CA Port Group" have the affinity mode configured "ON".
- If "All (all hosts)" has been specified in the "Host Group" field of host affinity, all the member ports of the assigned "CA Port Group" have the affinity mode configured "OFF".
- When one port is registered in several CA port groups, and the affinity setting has been configured on one of the CA port groups including the corresponding port, the affinity setting is configured on all the CA port groups, which include the corresponding port, and also on the member ports.
- CA port groups without a host affinity setting can be used for creating a host affinity regardless of whether the affinity mode is enabled (ON) or disabled (OFF).
- CA ports without a host affinity setting can be used for creating a host affinity regardless of whether the affinity mode is enabled (ON) or disabled (OFF).
- A host can be a member of several host groups. In addition, a CA port can be a member of several CA port groups. However, only one LUN group can be allocated to host and port combinations when configuring host affinity.

Note

- To change the settings of the host affinities, refer to "9.2.1.3 Modify Host Affinity" (page 428).
- Host groups with the host interface "FCoE" can configure host affinity with CA port groups with CA types "FC" or "FCoE".

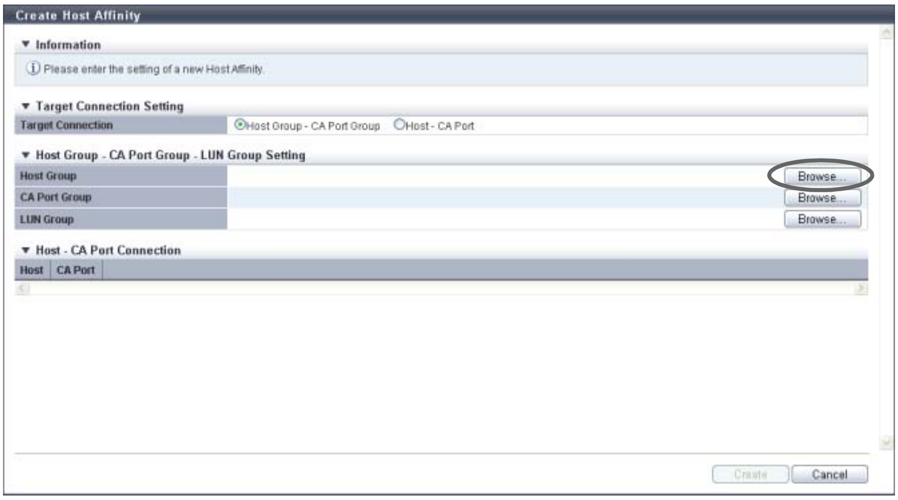
When "Host Group - CA Port Group" is selected for "Target Connection"

The procedure to create a host affinity is as follows:

Procedure

1 Click [Create Host Affinity] in [Action].

2 Click the [Browse...] button for the host group.

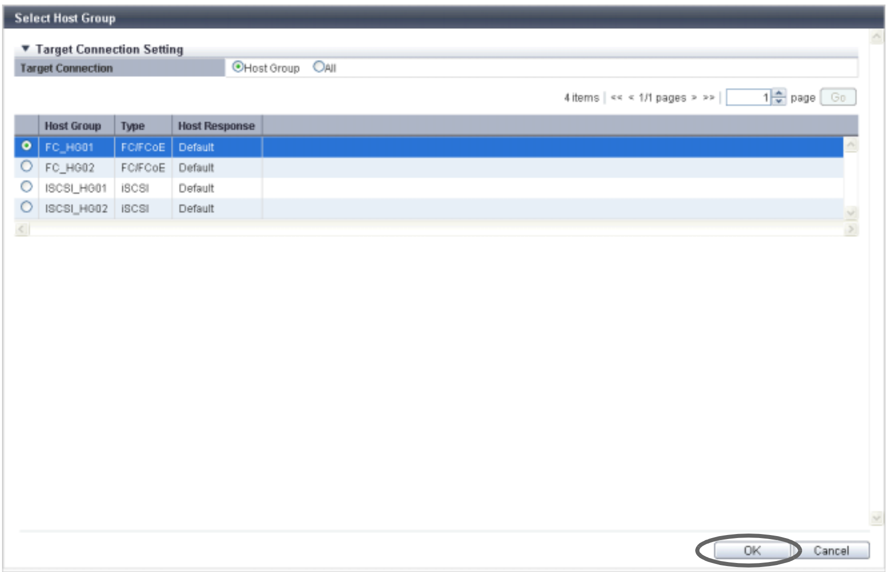


→ The [Select Host Group] screen appears.

3 Select the connection target.

■ When "Host Group" is selected

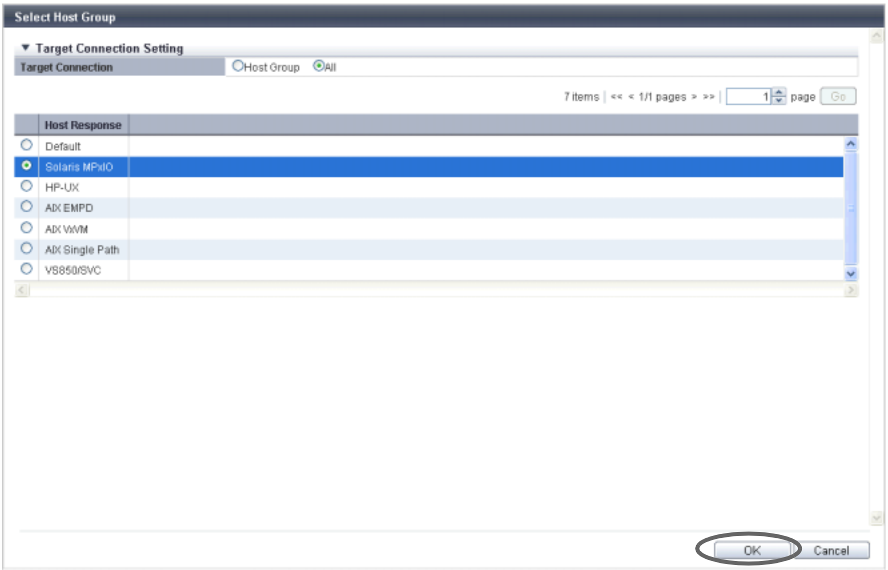
(1) Select a host group to configure a host affinity, and click the [OK] button.



→ The display returns to the initial screen.

■ When "All" is selected

(1) Select a host response, and click the [OK] button.



→ The display returns to the initial screen.

Caution

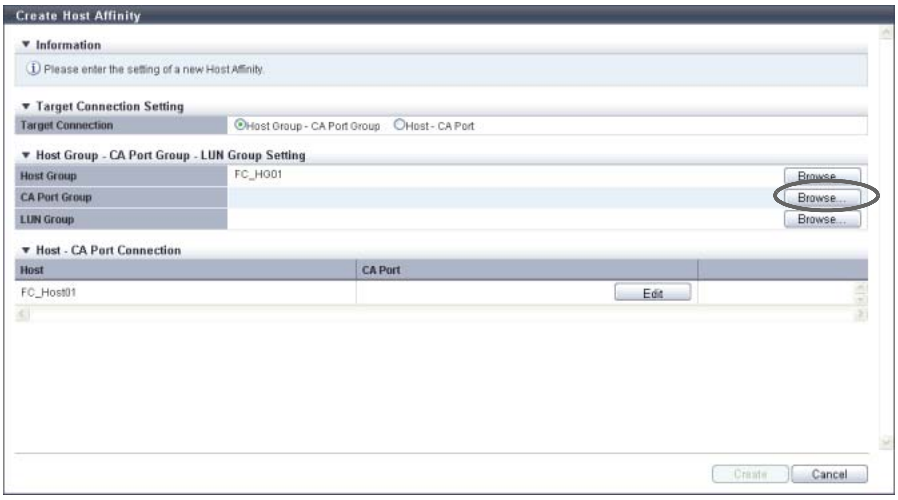
The following modifications are applied for the host response settings with firmware version V10L15 or later.

- "Others" is changed to "Default".
- "Windows EMPD", "Linux EMPD", and "Solaris EMPD" are deleted from the "Host Response" value. However, these parameters are displayed if they are applied for host groups.
- The setting parameters for "Windows EMPD", "Linux EMPD", and "Solaris EMPD" are the same as "Default".

Note

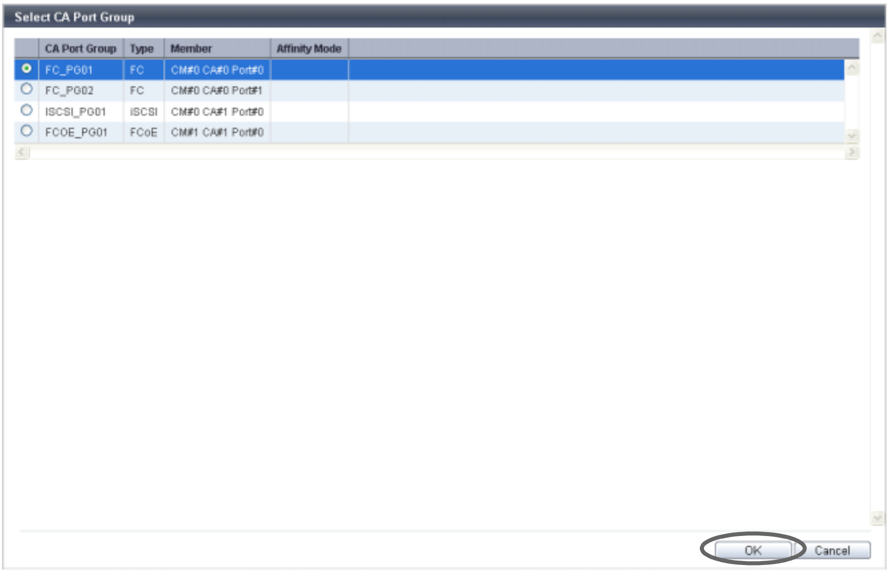
To allow all of the hosts to recognize the LUN group, select "All" for "Target Connection" and then select the host response. "All" is displayed in "All (host response name)" format.

4 Click the [Browse...] button for the CA port group.



→ The [Select CA Port Group] screen appears.

5 Select a CA port group to configure a host affinity, and click the [OK] button.

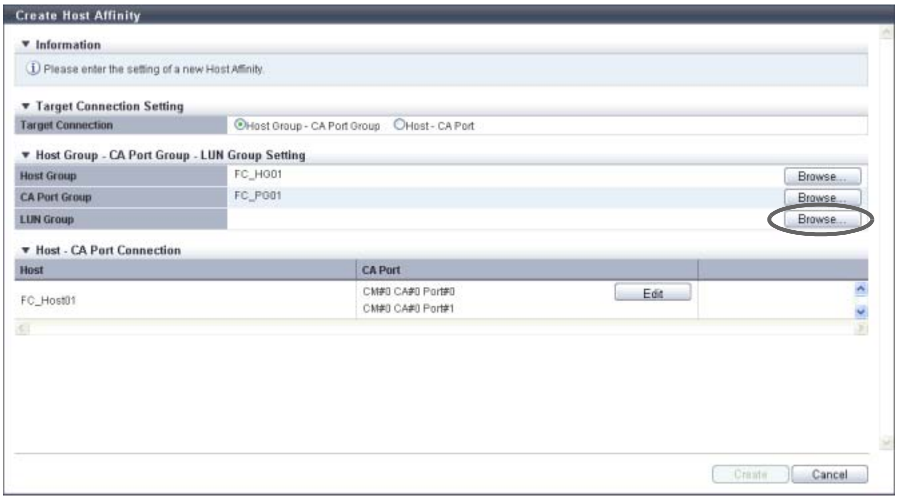


→ The display returns to the initial screen.

Note

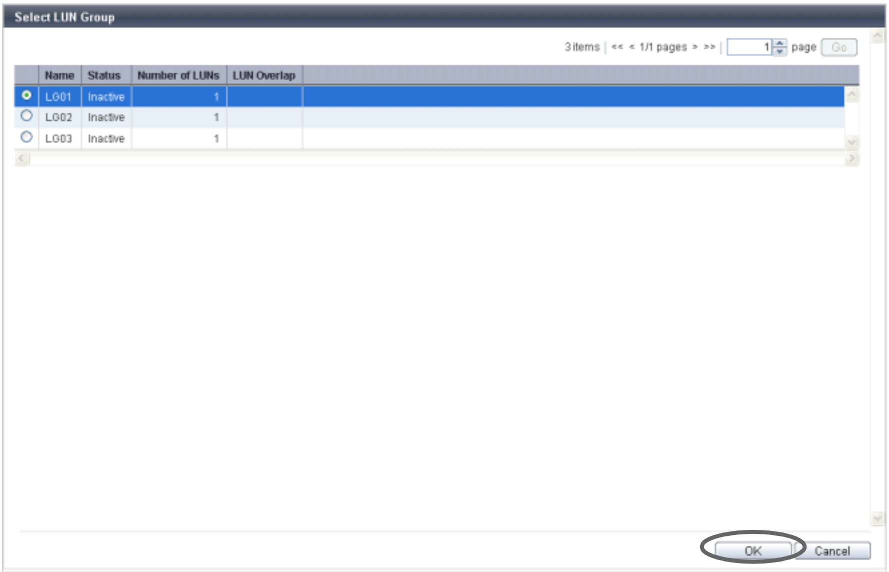
- If a specific host group has been selected in the "Host Group" field, CA port groups for which the affinity mode is "OFF" are not displayed.
- If "All" has been selected in the "Host Group" field, CA port groups with any of the following conditions are not displayed:
  - The affinity mode is "ON"
  - Member CA ports that used in other CA port groups
  - CA port groups that are being used by other host affinities

6 Click the [Browse...] button for the LUN group.



→ The [Select LUN Group] screen appears.

7 Select a LUN group to configure a host affinity, and click the [OK] button.



→ The display returns to the initial screen.

Caution

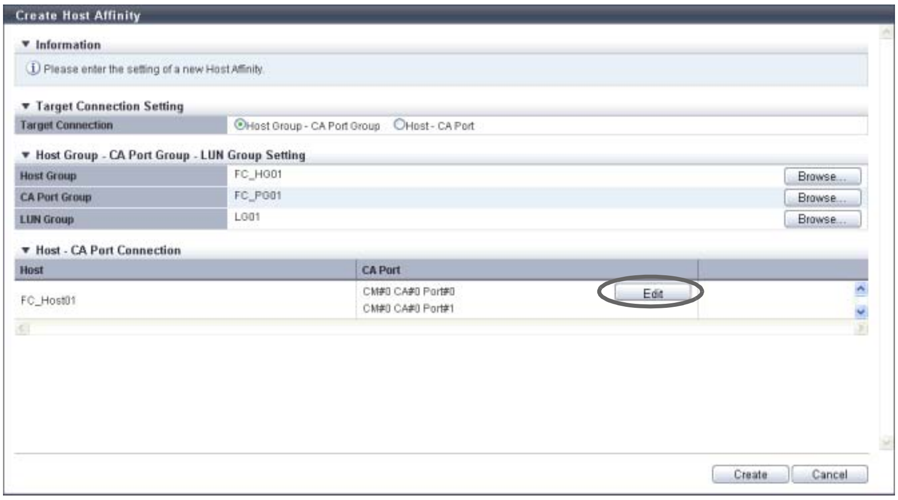
The LUN range that can be recognized from a host depends on the "Host Specific Mode" setting of the host response that is applied to the selected "Host Group" (specific host group) or "All" (all of the hosts). A host does not recognize any LUNs that are not included within the following ranges.
The following table shows the LUN range that can be recognized from a host for each "Host Specific Mode".

Host Specific Mode	LUN range that can be recognized from a host	
	When "Host Group" is selected	When "All" is selected
Normal	LUN#0 - LUN#255	LUN#0 - LUN#255
AIX Mode	LUN#0 - LUN#511	LUN#0 - LUN#511
NR1000V Mode	LUN#0 - LUN#511	LUN#0 - LUN#511
HP-UX Mode	LUN#0 - LUN#1023	LUN#0 - LUN#511
BS2000 Mode	LUN#0 - LUN#4095	LUN#0 - LUN#511

Note

When "All" is selected for "Host Group", the LUN groups in which LUNs are specified from LUN#512 onward are not displayed.

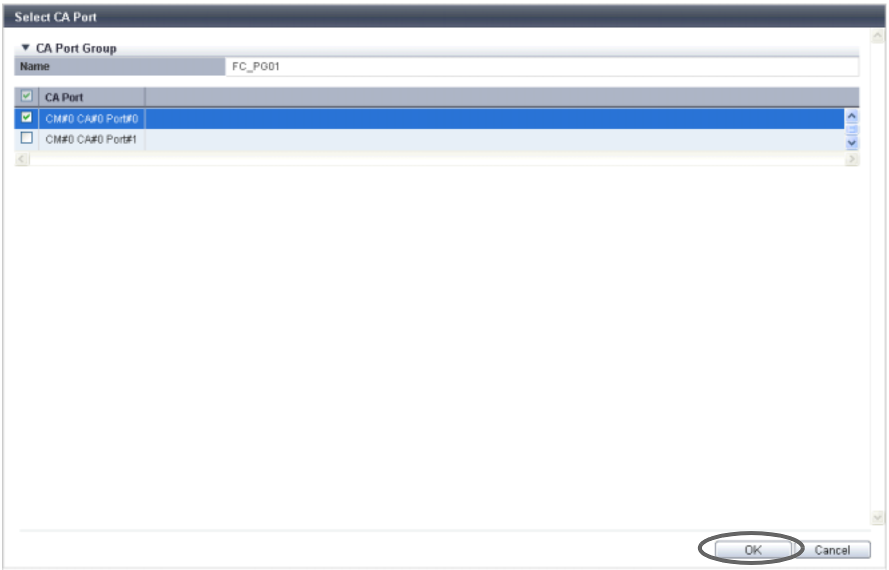
8 To edit the path between a host and a CA port, click the [Edit] button for the path to be edited.



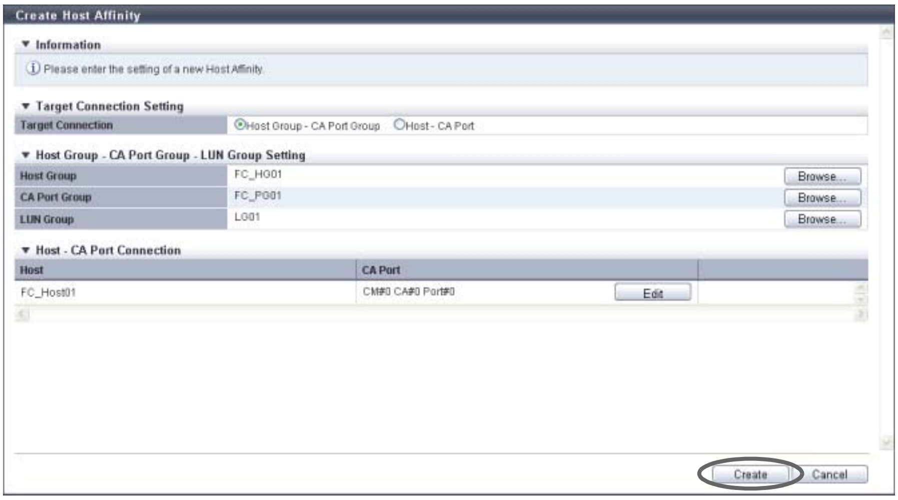
→ The [Select CA Port] screen appears.

9 Select whether to enable or disable the path between a host and a CA port, and click the [OK] button.

- Checkbox to select paths
  To enable the path between a host and a CA port, select the checkbox of the CA port.
  To disable the path between a host and a CA port, clear the checkbox of the CA port.



10 Confirm the host affinity setting and the path between the host and the CA port, click the [Create] button.



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When the host interface type of the host group and the CA type of the CA port group do not match Note that the CA types of "FCoE" and "FC" are regarded as the same CA type.
- When the number of host affinities exceeds the maximum number per ETERNUS DX Disk storage system
- When the number of hosts exceeds the maximum number per CA port
- When a host cannot recognize some LUNs

11 Click the [OK] button.



→ The host affinity creation starts.

12 Click the [Done] button to return to the [Connectivity] screen.

End of procedure

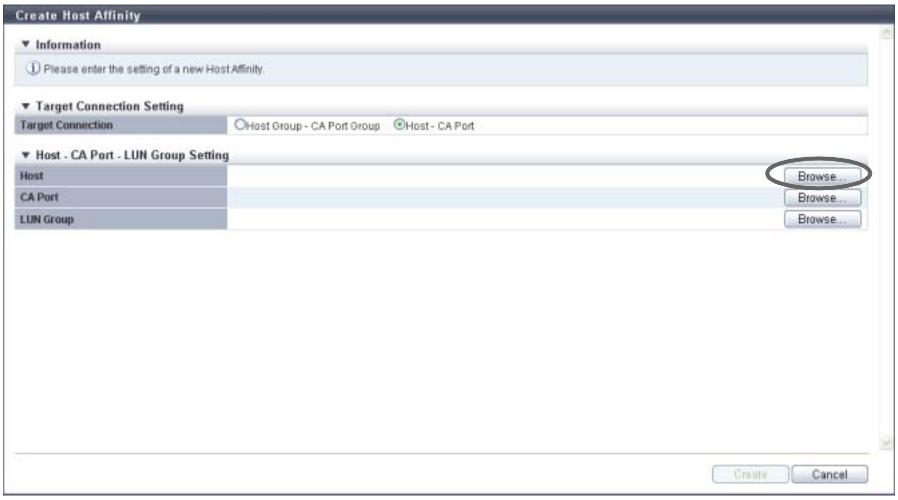
When "Host - CA Port" is selected for "Target Connection"

The procedure to create a host affinity is as follows:

Procedure

1 Click [Create Host Affinity] in [Action].

2 Click the [Browse...] button for the host.

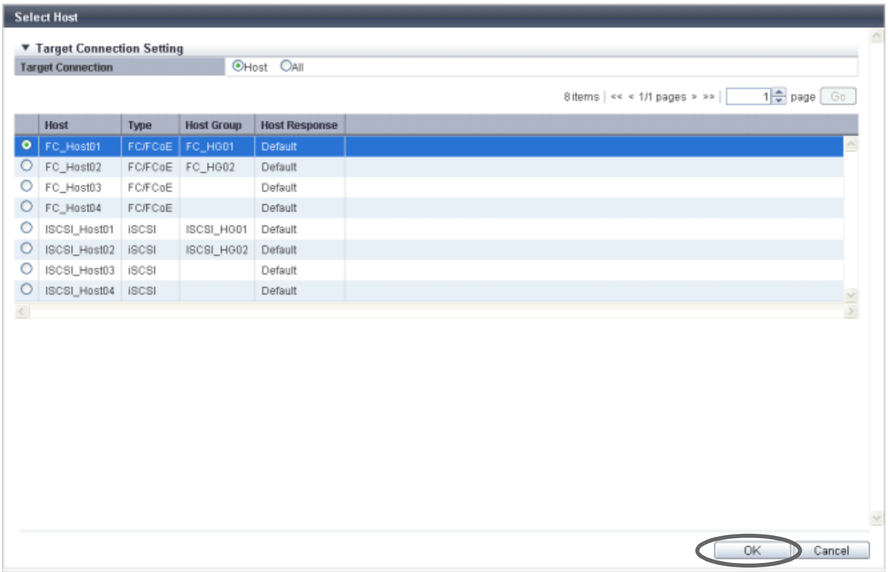


→ The [Select Host] screen appears.

3 Select the connection target.

■ When "Host" is selected

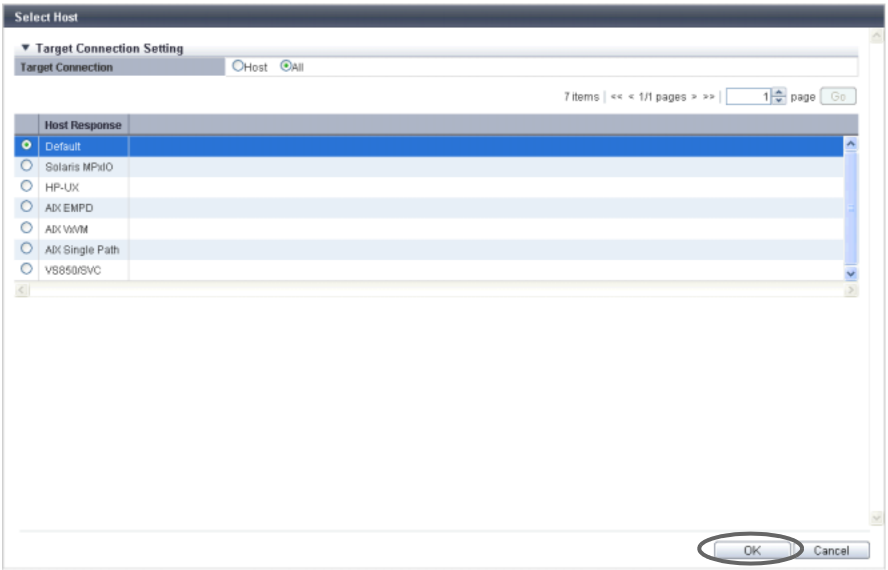
(1) Select a host to configure a host affinity, and click the [OK] button.



→ The display returns to the initial screen.

■ When "All" is selected

(1) Select a host response, and click the [OK] button.



→ The display returns to the initial screen.

Caution

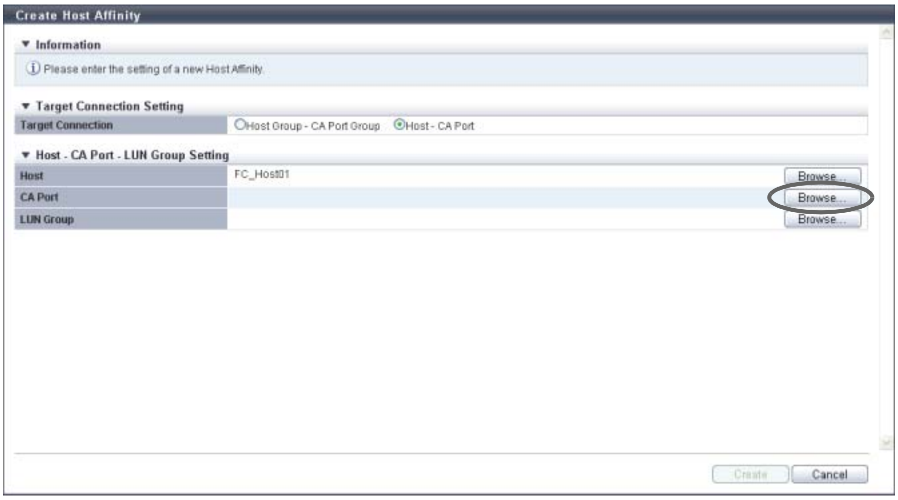
The following modifications are applied for the host response settings with firmware version V10L15 or later.

- "Others" is changed to "Default".
- "Windows EMPD", "Linux EMPD", and "Solaris EMPD" are deleted from the "Host Response" value. However, these parameters are displayed if they are applied for host groups.
- The setting parameters for "Windows EMPD", "Linux EMPD", and "Solaris EMPD" are the same as "Default".

Note

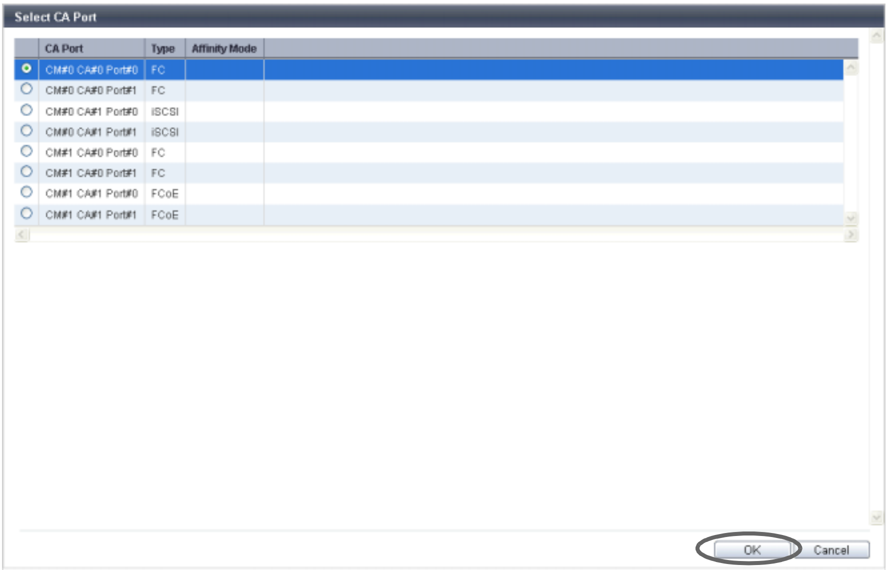
To allow all of the hosts to recognize the LUN group, select "All" for "Target Connection" and then select the host response. "All" is displayed in "All (host response name)" format.

4 Click the [Browse...] button for the CA port.



→ The [Select CA Port] screen appears.

5 Select a CA port to configure a host affinity, and click the [OK] button.

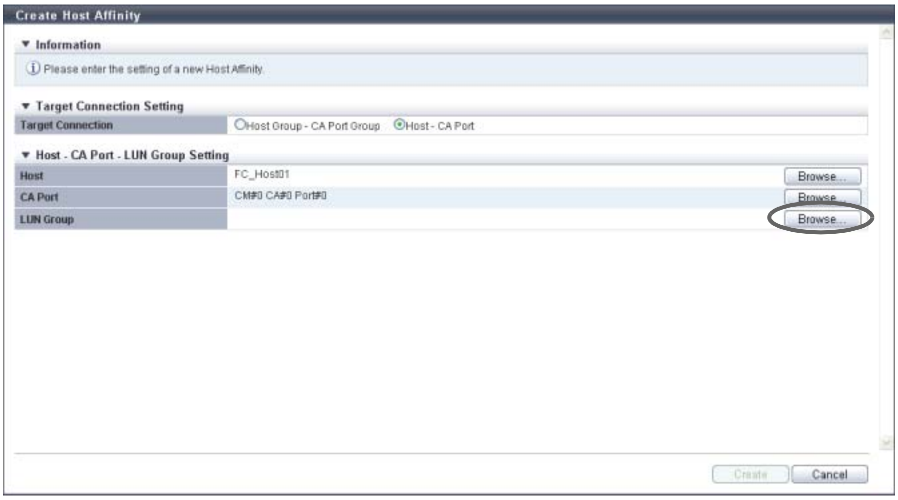


→ The display returns to the initial screen.

Note

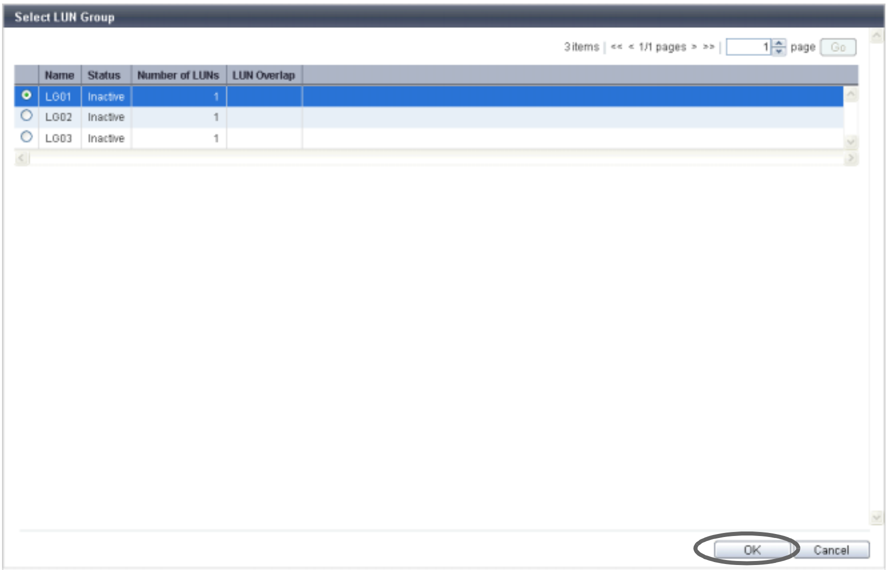
- If a specific host has been selected in the "Host" field, CA ports for which the affinity mode is "OFF" are not displayed.
- If "All" has been selected in the "Host" field, CA ports with any of the following conditions are not displayed:
  - The affinity mode is "ON"
  - The CA ports are used in the CA port group
  - The CA port is used by another host affinity

6 Click the [Browse...] button for the LUN group.



→ The [Select LUN Group] screen appears.

7 Select a LUN group to configure a host affinity, and click the [OK] button.



→ The display returns to the initial screen.

Caution

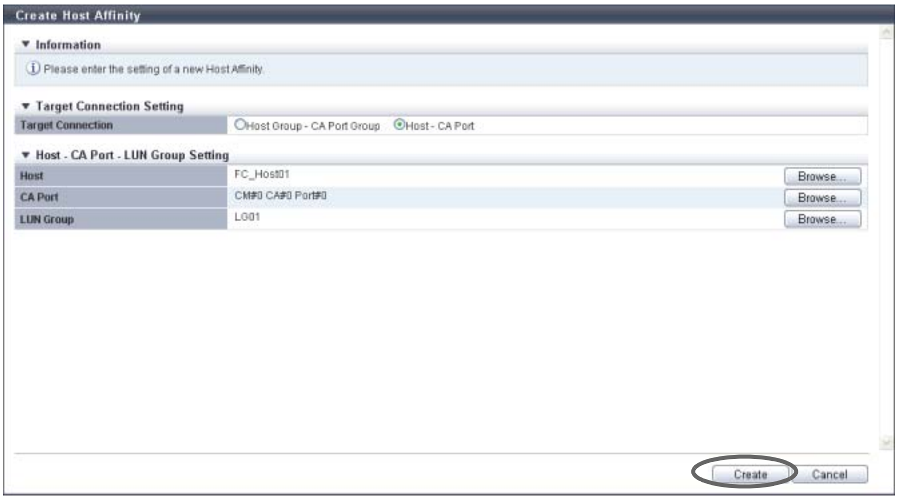
The LUN range that can be recognized from a host depends on the "Host Specific Mode" setting of the host response that is applied to the selected "Host" (specific host) or "All" (all of the hosts). A host does not recognize any LUNs that are not included within the following ranges.
The following table shows the LUN range that can be recognized from a host for each "Host Specific Mode".

Host Specific Mode	LUN range that can be recognized from a host	
	When "Host" is selected	When "All" is selected
Normal	LUN#0 - LUN#255	LUN#0 - LUN#255
AIX Mode	LUN#0 - LUN#511	LUN#0 - LUN#511
NR1000V Mode	LUN#0 - LUN#511	LUN#0 - LUN#511
HP-UX Mode	LUN#0 - LUN#1023	LUN#0 - LUN#511
BS2000 Mode	LUN#0 - LUN#4095	LUN#0 - LUN#511

Note

When "All" is selected for "Host", the LUN groups in which LUNs are specified from LUN#512 onward are not displayed.

8 After confirming the host affinity settings, click the [Create] button.



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When the host interface type of the host and the CA type of the CA port do not match
  Note that the CA types of "FCoE" and "FC" are regarded as the same CA type.
- When the number of host affinities exceeds the maximum number per ETERNUS DX Disk storage system
- When the number of hosts exceeds the maximum number per CA port
- When a host cannot recognize some LUNs

9 Click the [OK] button.



→ The host affinity creation starts.

10 Click the [Done] button to return to the [Connectivity] screen.

End of procedure

9.2.1.2 Delete Host Affinity

This function deletes the registered host affinity in the ETERNUS DX Disk storage system.
When a host affinity is deleted, the paths between "Host Group", "CA Port Group", and "LUN Group" or the paths between "Host", "CA Port", "and "LUN Group" are also deleted.

Caution

When deleting a host affinity, make sure to stop the access of the host which has been associated with the host affinity to be deleted.

The procedure to delete a host affinity is as follows:

Procedure

1 Select the host affinity to be deleted (multiple selections can be made) and click [Delete Host Affinity] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ The deletion of the host affinity starts.

Caution

If the selected host affinity does not exist, an error screen appears.

3 Click the [Done] button to return to the [Connectivity] screen.

End of procedure

9.2.1.3 Modify Host Affinity

This function is used to perform the following modifications to the existing host affinity.

- Changing the "CA Port Group" or "CA Port" settings
- Changing the "LUN Group" setting
- Changing the "CA Ports in a CA Port Group" setting (Change the path between the host and the CA port)
- Changing the "Host Response" setting (only when "Host Group" or "Host" is "All")

Not only the path between the existing host and the CA port, but also the path between a host and a CA port, which has been added after creating a host affinity, can be modified.

- The maximum number of connectable hosts (the number of HBAs) per CA port is 256.

Caution

- When modifying an active host affinity, make sure to stop the access of the host which has been associated with the host affinity to be modified.
- When one port is registered in several CA port groups, and the affinity setting has been configured on one of the CA port groups including the corresponding port, the affinity setting is configured on all the CA port groups, which include the corresponding port, and also on the member ports.
- CA port groups without a host affinity setting can be used for creating a host affinity regardless of whether the affinity mode is enabled (ON) or disabled (OFF).
- CA ports without a host affinity setting can be used for creating a host affinity regardless of whether the affinity mode is enabled (ON) or disabled (OFF).
- A host can be a member of several host groups. In addition, a CA port can be a member of several CA port groups. However, only one LUN group can be allocated to host and port combinations when changing host affinity settings.

Note

- When the procedure in "9.2.2.5 Modify Host Group" (page 463) is used to add a host to a host group, the paths between the added host and all of the ports that are in the associated CA port group are configured.
- When the procedure in "9.2.3.6 Modify CA Port Group" (page 528) is used to add a port to a CA port group, the paths between all of the hosts in the host group and the added port are configured.
- Host groups with the host interface "FCoE" can configure host affinity with CA port groups with CA types "FC" or "FCoE".

When selecting a host affinity for "Host Group - CA Port Group"

The procedure to modify a host affinity is as follows:

Procedure

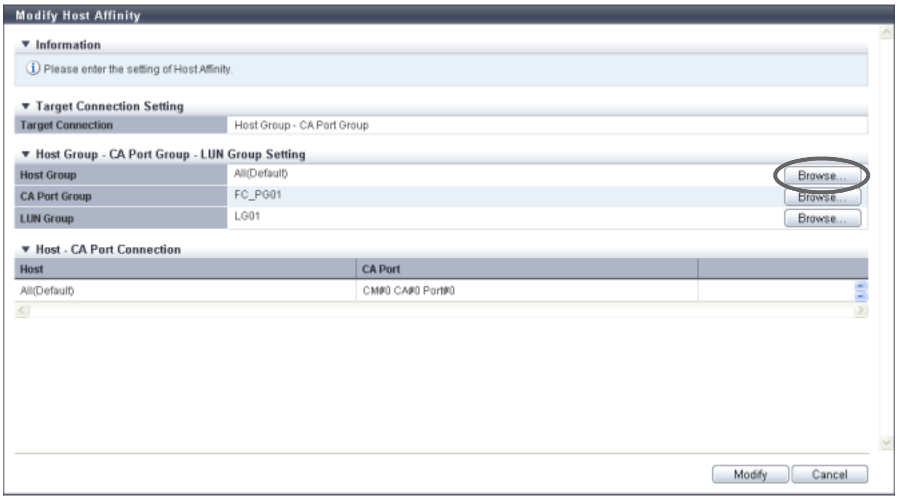
1 Select the host affinity to be modified, and click [Modify Host Affinity] in [Action].

2 Check the display contents of the host group.

The next step that needs to be performed depends on the display contents of the host group.

■ When the selected host group is "All (host response name)"

(1) Click the [Browse...] button.

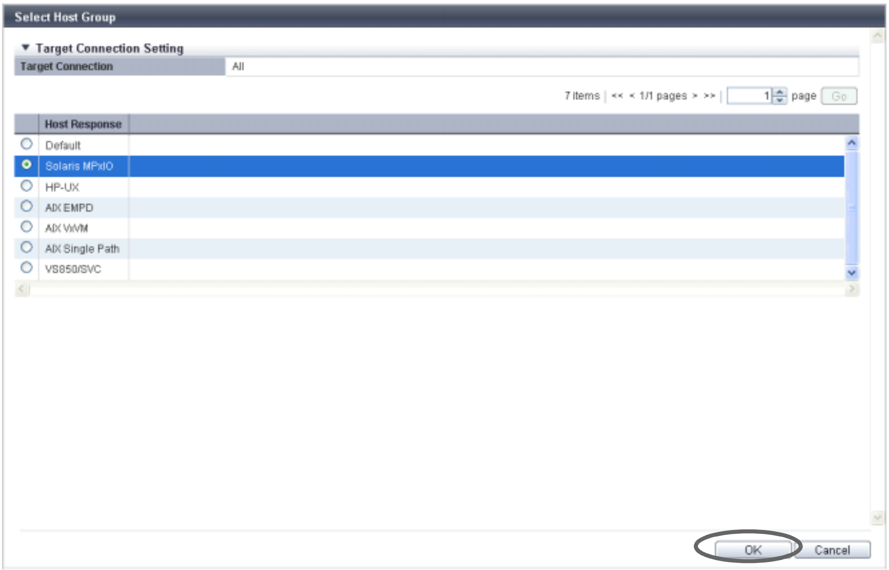


→ The [Select Host Group] screen appears. Proceed to Step 3.

■ When the host group is not "All (host response name)"

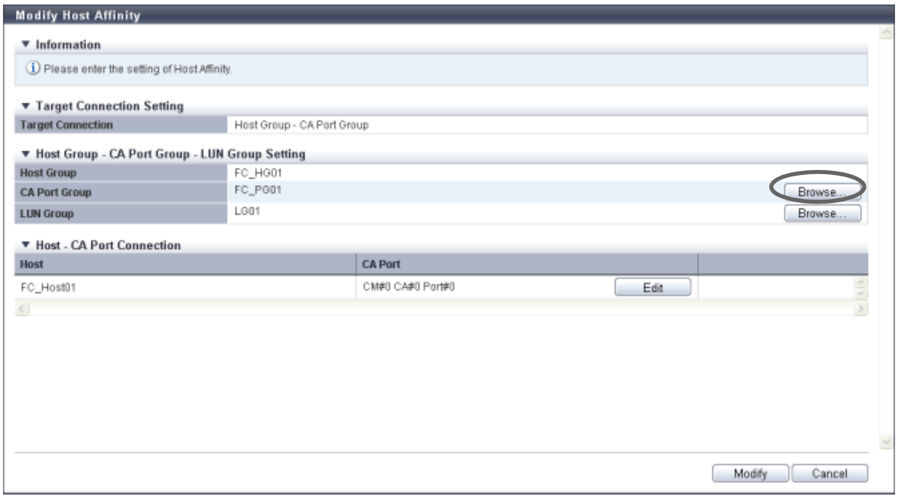
→ Proceed to Step 4.

3 Select the host response that is to be assigned to all of the hosts and click the [OK] button.



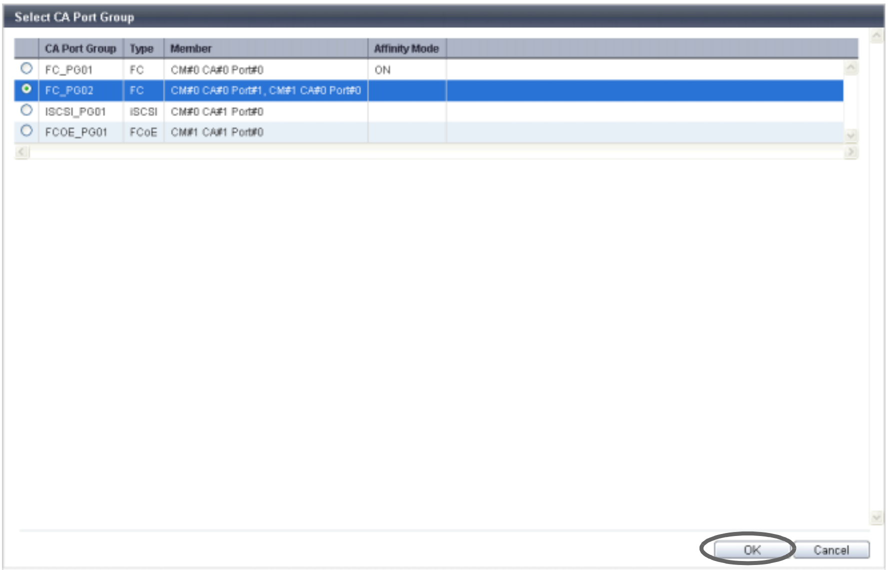
→ The display returns to the initial screen.

4 Click the [Browse...] button for the CA port group.



→ The [Select CA Port Group] screen appears.

5 Select a CA port group to configure a host affinity, and click the [OK] button.

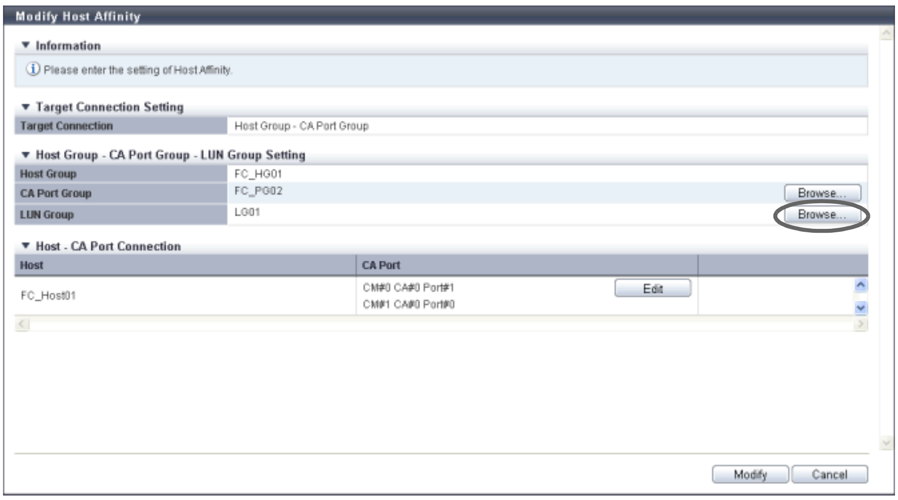


→ The display returns to the initial screen.

Note

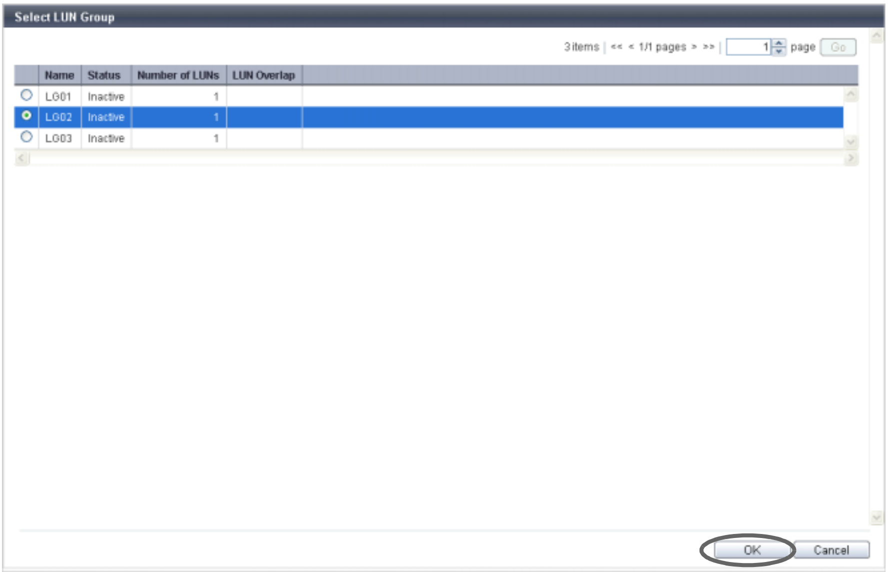
- If a specific host group has been selected in the "Host Group" field, CA port groups with any of the following conditions are not displayed:
  - The affinity mode is "OFF"
  - The CA port group is used by another host affinity
- If "All" has been selected in the "Host Group" field, CA port groups with any of the following conditions are not displayed:
  - The CA port group is used by another host affinity
  - Member CA ports that used in other CA port groups

6 Click the [Browse...] button for the LUN group.



→ The [Select LUN Group] screen appears.

7 Select a LUN group to configure a host affinity, and click the [OK] button.



→ The display returns to the initial screen.

Caution

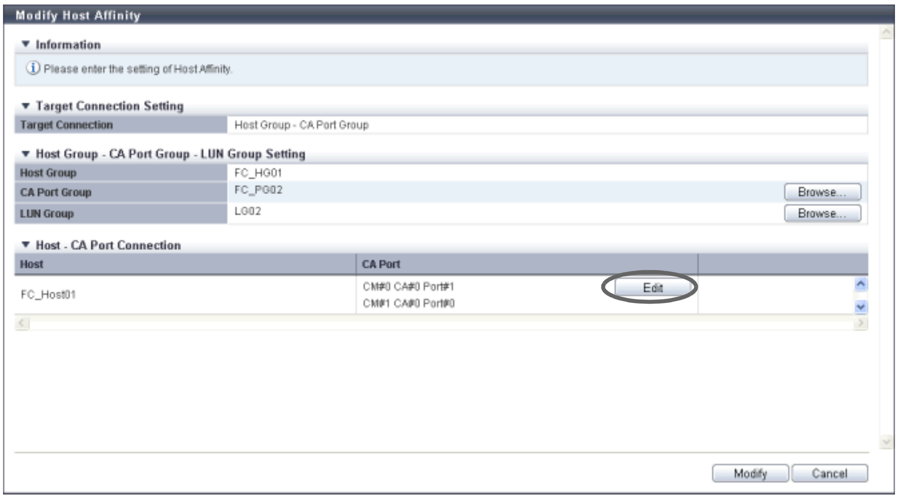
- The LUN range that can be recognized from a host is determined by which of the following settings is used. A host does not recognize any LUNs that are not included within the following ranges.
  - The "Host Specific Mode" setting of the host response that is applied to "Host Group" (specific host group) with the host affinity setting
  - The "Host Specific Mode" setting of the host response that is applied to "All" (all of the hosts) with the host affinity setting
  - The "Host Specific Mode" setting of the host response that is newly applied to "All" (all of the hosts) with the host affinity setting
- The following table shows the LUN range that can be recognized from a host for each "Host Specific Mode".

Host Specific Mode	LUN range that can be recognized from a host	
	For "Host Group"	For "All"
Normal	LUN#0 - LUN#255	LUN#0 - LUN#255
AIX Mode	LUN#0 - LUN#511	LUN#0 - LUN#511
NR1000V Mode	LUN#0 - LUN#511	LUN#0 - LUN#511
HP-UX Mode	LUN#0 - LUN#1023	LUN#0 - LUN#511
BS2000 Mode	LUN#0 - LUN#4095	LUN#0 - LUN#511

Note

When "All" is selected for "Host Group", the LUN groups in which LUNs are specified from LUN#512 onward are not displayed.

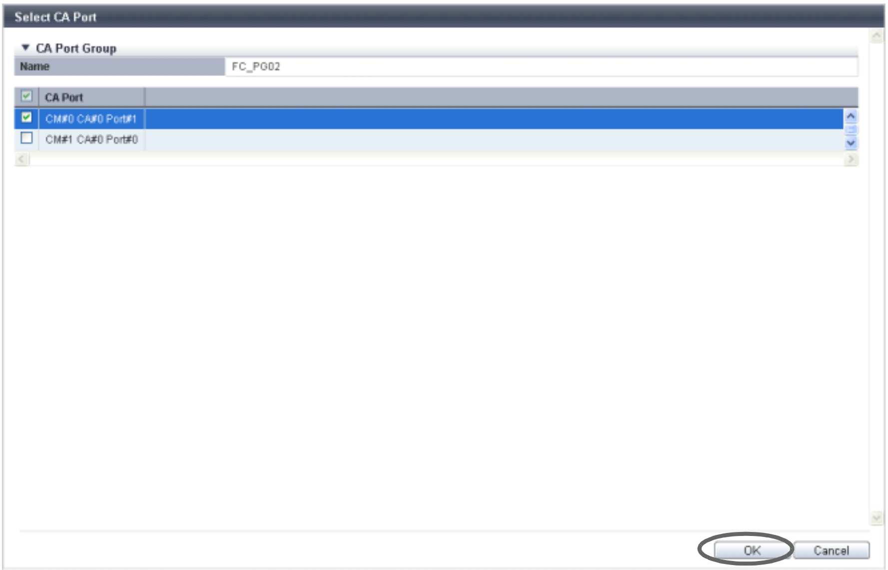
8 To edit the path between a host and a CA port, click the [Edit] button for the path to be edited.



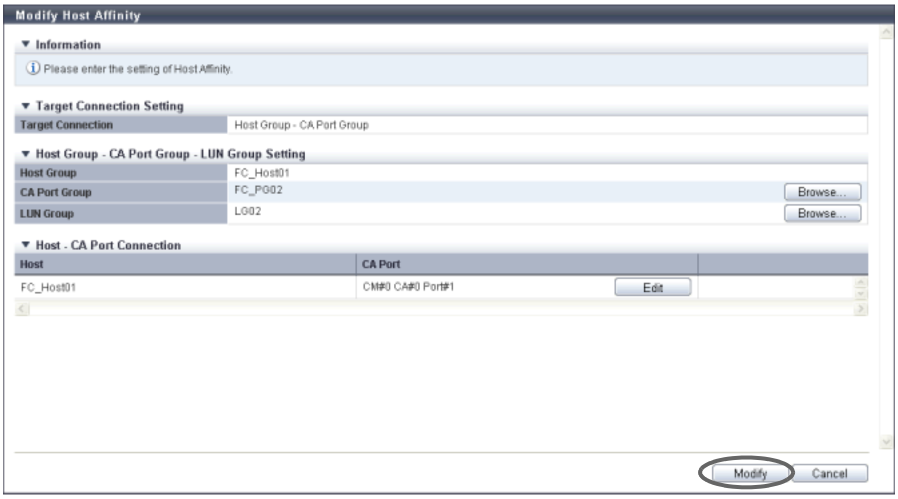
→ The [Select CA Port] screen appears.

9 Select whether to enable or disable the path between a host and a CA port, and click the [OK] button.

- Checkbox to select paths
  To enable the path between a host and a CA port, select the checkbox of the CA port.
  To disable the path between a host and a CA port, clear the checkbox of the CA port.



10 Confirm the modified host affinity setting and the path between the host and the CA port, click the [Modify] button.



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When the host interface type of the host group and the CA type of the CA port group do not match
  Note that the CA types of "FCoE" and "FC" are regarded as the same CA type.
- When the number of hosts exceeds the maximum number per CA port
- When a host cannot recognize some LUNs

11 Click the [OK] button.



→ The modification of the host affinity starts.

12 Click the [Done] button to return to the [Connectivity] screen.

End of procedure

When selecting a host affinity for "Host - CA Port"

The procedure to modify a host affinity is as follows:

Procedure

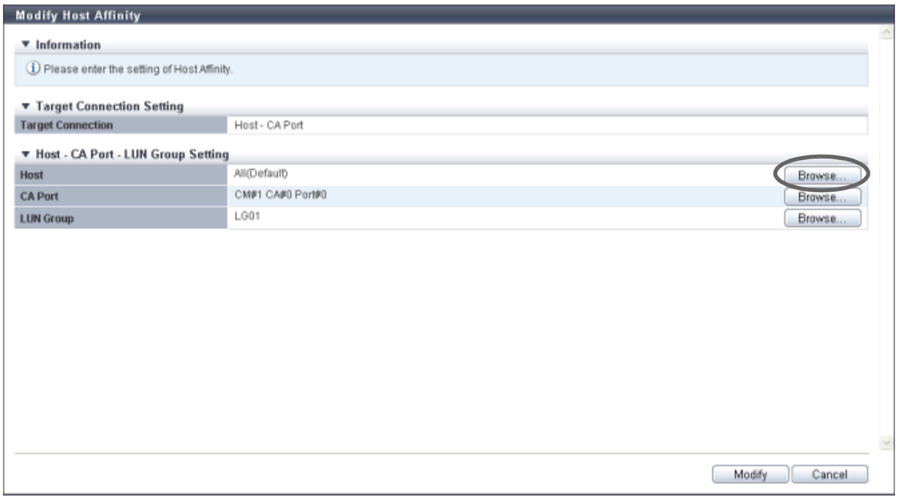
1 Select the host affinity to be modified, and click [Modify Host Affinity] in [Action].

2 Check the display contents of the host.

The next step that needs to be performed depends on the display contents of the host.

■ When the selected host is "All (host response name)"

(1) Click the [Browse...] button.

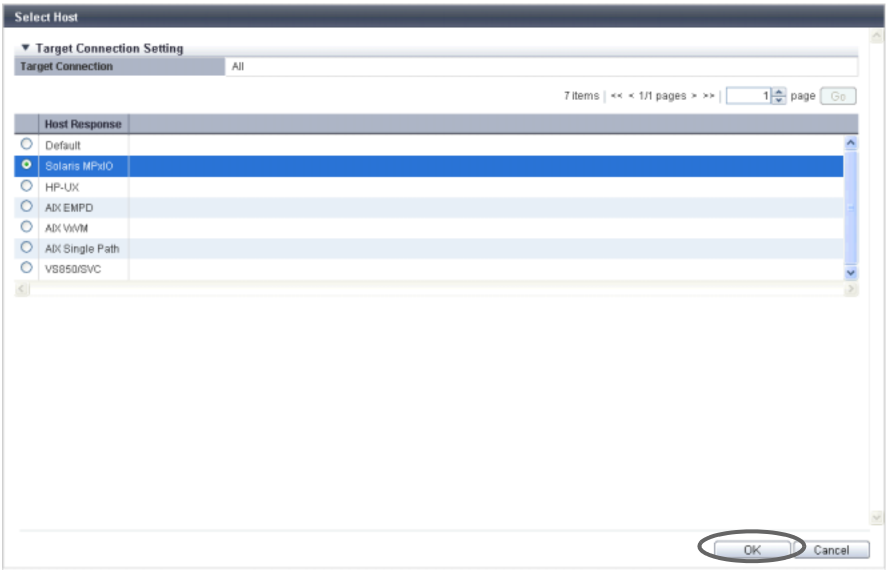


→ The [Select Host] screen appears. Proceed to Step 3.

■ When the host is not "All (host response name)"

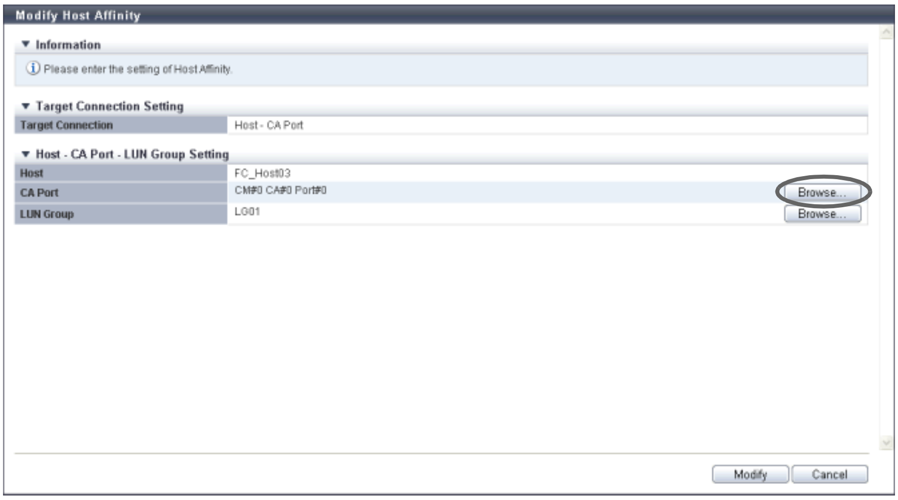
→ Proceed to Step 4.

3 Select the host response that is to be assigned to all of the hosts and click the [OK] button.



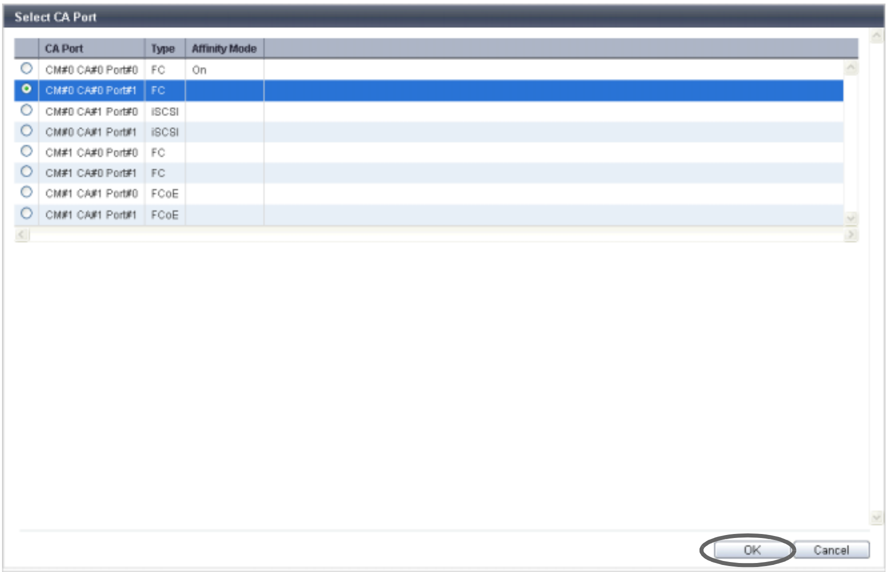
→ The display returns to the initial screen.

4 Click the [Browse...] button for the CA port.



→ The [Select CA Port] screen appears.

5 Select a CA port to configure a host affinity, and click the [OK] button.

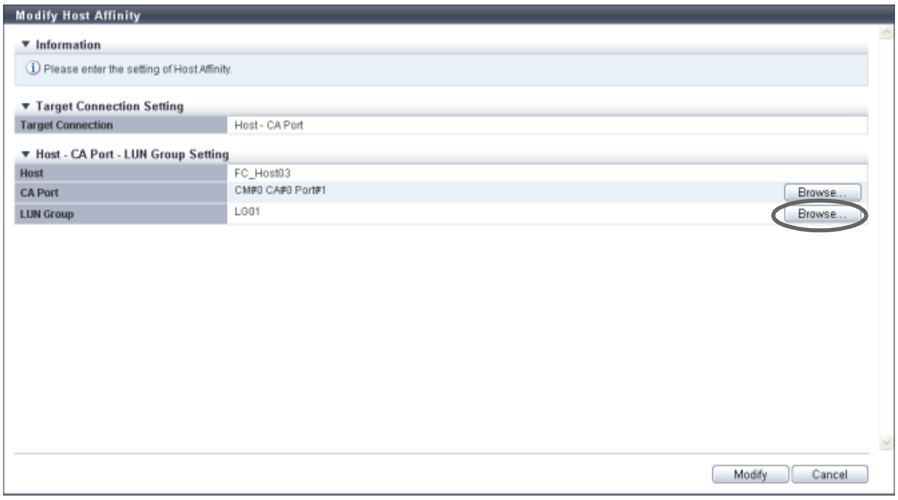


→ The display returns to the initial screen.

Note

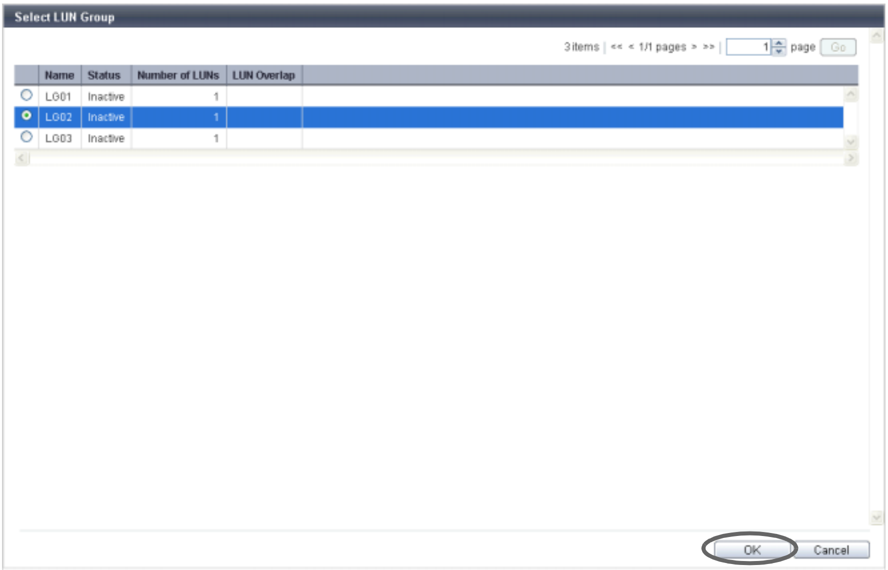
- If a specific host has been selected in the "Host" field, CA ports with any of the following conditions are not displayed:
  - The affinity mode is "OFF"
  - The CA port is used by another host affinity
- If "All" has been selected in the "Host" field, CA ports with any of the following conditions are not displayed:
  - The CA port is used by another host affinity
  - The CA port is used in the CA port group

6 Click the [Browse...] button for the LUN group.



→ The [Select LUN Group] screen appears.

7 Select a LUN group to configure a host affinity, and click the [OK] button.



→ The display returns to the initial screen.

Caution

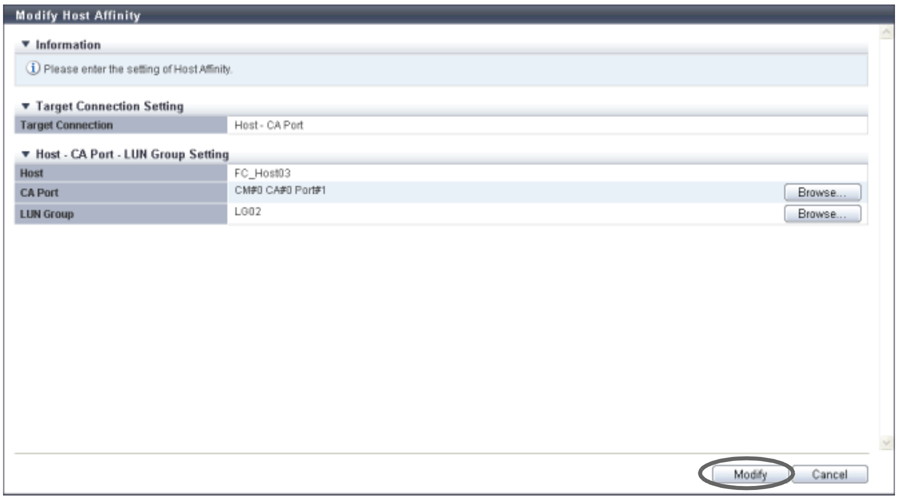
- The LUN range that can be recognized from a host is determined by which of the following settings is used. A host does not recognize any LUNs that are not included within the following ranges.
  - The "Host Specific Mode" setting of the host response that is applied to "Host" (specific host) with the host affinity setting
  - The "Host Specific Mode" setting of the host response that is applied to "All" (all of the hosts) with the host affinity setting
  - The "Host Specific Mode" setting of the host response that is newly applied to "All" (all of the hosts) with the host affinity setting
- The following table shows the LUN range that can be recognized from a host for each "Host Specific Mode".

Host Specific Mode	LUN range that can be recognized from a host	
	For "Host"	For "All"
Normal	LUN#0 - LUN#255	LUN#0 - LUN#255
AIX Mode	LUN#0 - LUN#511	LUN#0 - LUN#511
NR1000V Mode	LUN#0 - LUN#511	LUN#0 - LUN#511
HP-UX Mode	LUN#0 - LUN#1023	LUN#0 - LUN#511
BS2000 Mode	LUN#0 - LUN#4095	LUN#0 - LUN#511

Note

When "All" is selected for "Host", the LUN groups in which LUNs are specified from LUN#512 onward are not displayed.

8 After confirming the host affinity settings, click the [Modify] button.



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When the host interface type of the host and the CA type of the CA port do not match
  Note that the CA types of "FCoE" and "FC" are regarded as the same CA type.
- When the number of hosts exceeds the maximum number per CA port
- When a host cannot recognize some LUNs

9 Click the [OK] button.



→ The modification of the host affinity starts.

10 Click the [Done] button to return to the [Connectivity] screen.

End of procedure

9.2.2 Host Group Management

Host group management provides the following functions:

9.2.2.1 Add FC/FCoE Host Group

This function creates a new FC host group and registers which hosts are members of this group.
An FC host group uses FC or FCoE as the interface type, and groups the hosts (HBAs), which access the same LUN group. This function configures Host Affinity settings for each FC host group.

The number of host groups and hosts that can be registered

Model	Number of host groups (*1) per storage system	Number of hosts (HBAs) (*2) per storage system	Number of hosts (HBAs) per CA port	Number of hosts (HBAs) per host group
ETERNUS DX80 S2	128	1024	256	8
ETERNUS DX90 S2				
ETERNUS DX410 S2				
ETERNUS DX440 S2				
ETERNUS DX8100 S2				
ETERNUS DX8700 S2	512	8192		64

*1: The total number of host groups irrespective of the interface types.
*2: The total number of hosts irrespective of the interface types.

Caution

- Registration of the host is necessary to create a host group. Create a new host group when registering a host with GUI by using this function.
- A host can be a member of several host groups. However, only one LUN group can be allocated to host and port combinations when configuring host affinity.
- To assign an appropriate host response to a created host group, refer to "User's Guide -Server Connection-" for each OS type. The host response configures the operation mode that is appropriate for the host.
  If an appropriate host response is not configured to the host group, the path may not be switched correctly or the volume may not be recognized correctly.
- The host response that is specified for a host group is applied all the member hosts in the target group. When a host belongs to multiple host groups, the same host response must be applied for all the groups to which the target host belongs. When a host that already belongs to an existing host group is added to a newly created host group, the host response of the new host group is applied to the host. The host response of the existing host group to which the target host belongs is also changed. Refer to "Example of changing the host response when adding a host group" (page 447) for details.
- The name of the [Add FC/FCoE Host] function, which creates a new FC host group and registers the member hosts, has changed with firmware version V10L50. The [Add FC/FCoE Host] function is now called the [Add FC/FCoE Host Group] function.

Note

- To change the settings of the host groups, use the procedure in "9.2.2.5 Modify Host Group" (page 463).
- To add a port to an existing host group, use the procedure in "9.2.2.5 Modify Host Group" (page 463).
- To change the host name or WWN, use the procedure in "9.2.2.15 Modify FC/FCoE Host" (page 507).
- An FC host and an FCoE host can be members of the same host group. Both "FC host" and "FCoE host" are abbreviated as "FC host" in this section.

The procedure to create an FC host group is as follows:

Procedure

1 Click [Add FC/FCoE Host Group] in [Action].

2 Input a host group name to be created, and select a host response to be assigned to the host group.

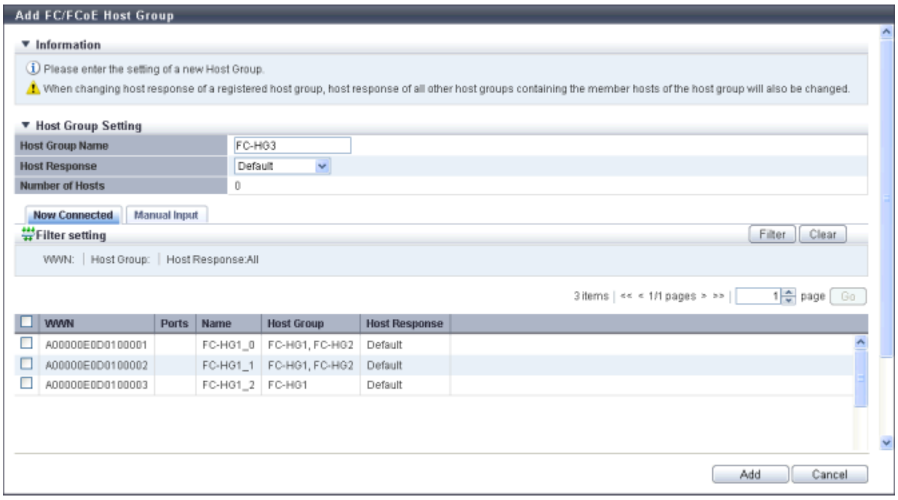
- Host Group Name
  Specify the host group name.
  An existing host group name cannot be specified. Refer to "Naming conventions for adding hosts" (page 994) for details.
  The following input conditions apply:
  - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space
- Host Response
  Select a host response to be assigned to a host group.
  The host response list created in the ETERNUS DX Disk storage system is displayed.
  - Solaris MPxIO
  - HP-UX
  - AIX EMPD (*1)
  - AIX VxVM
  - AIX Single Path
  - VS850/SVC
  - Host responses created in the ETERNUS DX Disk storage system
  - Default

  *1: EMPD: ETERNUS Multipath Driver

Caution

The following modifications are applied for the host response settings with firmware version V10L15 or later.

- "Others" is changed to "Default".
- "Windows EMPD", "Linux EMPD", and "Solaris EMPD" are deleted from the "Host Response" value.
- The setting parameters for "Windows EMPD", "Linux EMPD", and "Solaris EMPD" are the same as "Default".



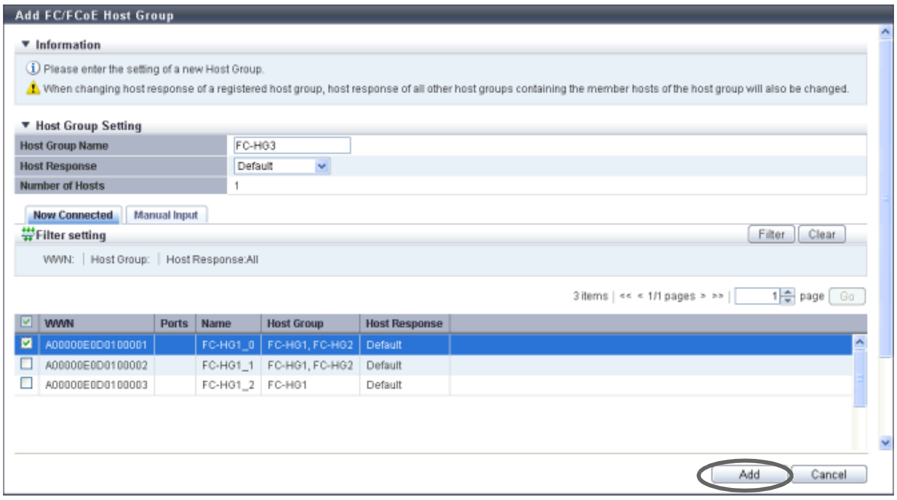
3 Register a host in a host group in the following procedures.

■ When registering a host by selecting from the host list

(1) Click the [Now Connected] tab.

(2) Select a host that is to be registered from the FC host list, and click the [Add] button.

- Checkbox to select a host
  Select the FC host checkbox to be registered in a host group.



→ A confirmation screen appears.

Filter setting

Filter	Description
WWN	Input the WWN that is to be displayed. FC hosts matching or partially matching the input WWN are displayed. When not using the WWN for filtering, leave this item blank.
Host Group	Input the host group name that is to be displayed. FC hosts which belong to any host groups that match or partially match the entered name are displayed. When not using the host group name for filtering, leave this item blank.
Host Response	Select the host response that is to be displayed. Any FC hosts that are allocated to the selected host response are displayed.

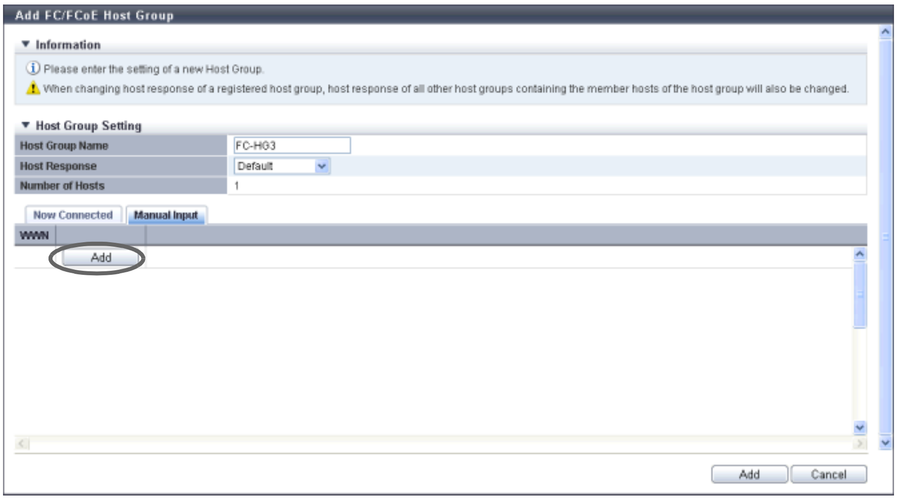
Caution

- If the WWN is not displayed when clicking the [Rediscover] button, make sure that there is no error in the connection environment, such as the connection between the host and the switch, and the CA port settings of the ETERNUS DX Disk storage system. If there is no error in the connection environment, contact the Support Department, or specify the WWN manually.
- An error screen appears in the following conditions:
  - When the "Host Group Name" is not entered
  - When the "Host Group Name" does not satisfy the input conditions
  - When the "Host Group Name" overlaps with an existing host group name
    (Host group names cannot overlap with any other host group names, irrespective of the interface types.)
  - When no hosts are registered in a host group, or when nine or more hosts are registered in a host group (for ETERNUS DX8700 S2, 65 or more hosts are registered in a host group)
  - When the total number of host groups has exceeded the maximum number for the ETERNUS DX Disk storage system
  - When the total number of hosts has exceeded the maximum number for the ETERNUS DX Disk storage system

■ When registering a host by manually specifying the host

(1) Click the [Manual Input] tab.

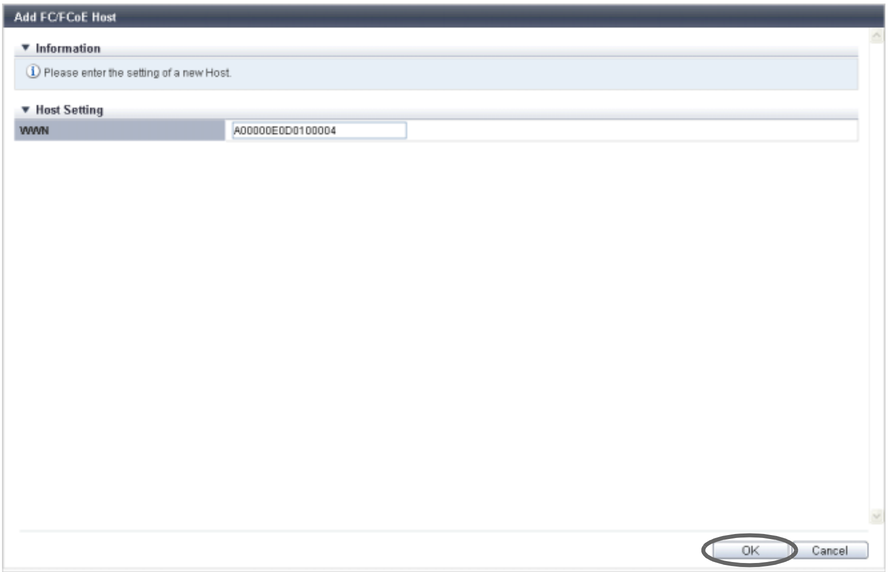
(2) Click the [Add] button.



→ The [Add FC/FCoE Host] screen appears.

(3) Manually specify the WWN of the host that is to be registered, and click the [OK] button.

- WWN
  Input the WWN for the FC host.
  The following input conditions apply:
  - 16 hexadecimal numbers
  - "F (f)" or "0" used in entire 16 characters are not allowed.



→ Returns to the [Manual Input] screen.

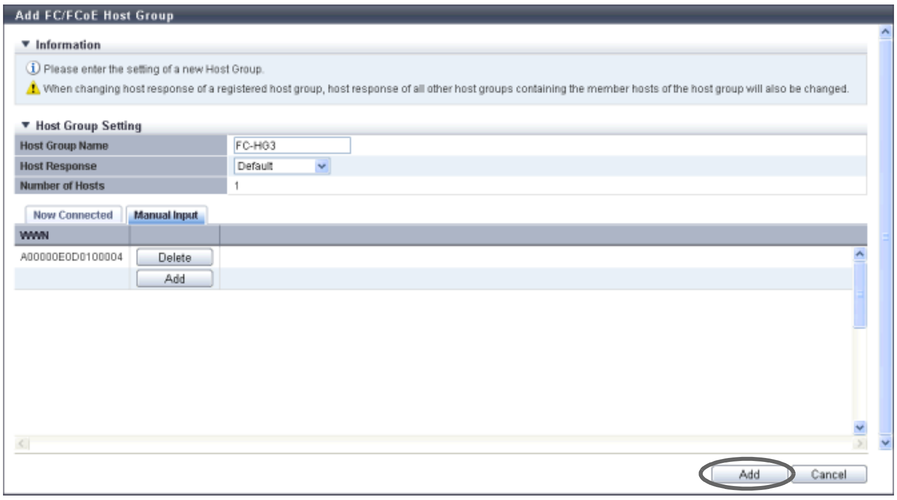
Caution

An error screen appears in the following conditions:

- When the "WWN" is not input
- When the "WWN" does not satisfy the input conditions

(4) Repeat Step (2) and Step (3) to set more WWNs.

(5) After adding the FC host is complete, click the [Add] button.



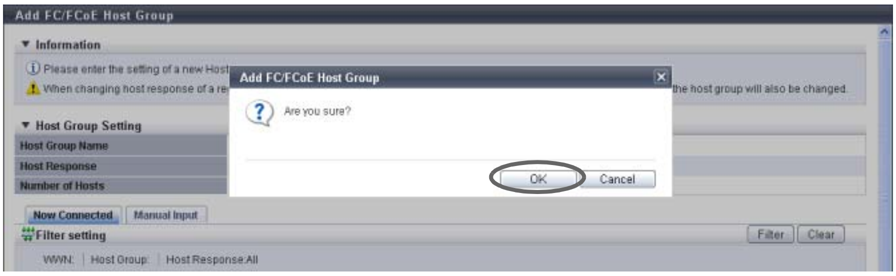
→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When the "Host Group Name" is not input
- When the "Host Group Name" does not satisfy the input conditions
- When the "Host Group Name" overlaps with an existing host group name
  (host group names cannot overlap with any other host group names, irrespective of the interface types)
- When the several FC hosts with the same WWNs have been registered
- When no hosts are registered in a host group, or when nine or more hosts are registered in a host group (for ETERNUS DX8700 S2, 65 or more hosts are registered in a host group)
- When the total number of host groups has exceeded the maximum number for the ETERNUS DX Disk storage system
- When the total number of hosts has exceeded the maximum number for the ETERNUS DX Disk storage system

4 Click the [OK] button.



→ Registration of the FC host group starts.

5 Click the [Done] button to return to the [Host Group] screen.

Note

Click the [Continue] button to continue adding FC hosts.

End of procedure

Example of changing the host response when adding a host group

Host group (Host response)	Member host	Host response that is allocated to the host
Host_G1 (Default)	Host-1	Default
	Host-2	Default
Host_G2 (Default)	Host-2	Default
	Host-3	Default

When a host "Host_G3" (host response: HR_1) is created with "Host-3" and "Host-4" and added to the host groups listed in the table above, the host response is changed as follows:

1. The host response for Host-3 is changed from "Default" to "HR_1" (the host response for Host_G3).
2. Since the host response for Host-3 is changed, the host response for Host_G2 to which Host-3 belongs is also changed from "Default" to "HR_1".
   (The host response for Host_2, which is the member host of Host_G2, is changed from "Default" to "HR_1".)
3. Since the host response for Host-2 is changed, the host response for Host_G1 to which Host-2 belongs is also changed from "Default" to "HR_1".
   (The host response for Host_1, which is the member host of Host_G1, is changed from "Default" to "HR_1".)

The following table shows the host response after new hosts are added.

Host group (Host response)	Member host	Host response that is allocated to the host
Host_G1 (HR_1)	Host-1	HR_1
	Host-2	HR_1
Host_G2 (HR_1)	Host-2	HR_1
	Host-3	HR_1
Host_G3 (HR_1)	Host-3	HR_1
	Host-4	HR_1

Example of changing the host response when adding a host to an existing host group

Host group (Host response)	Member host	Host response that is allocated to the host
Host_G1 (Default)	Host-1	Default
	Host-2	Default
Host_G2 (Default)	Host-2	Default
	Host-3	Default
Host_G3 (HR_1)	Host-4	HR_1

When a host "Host_3" is added to the existing host group "Host_G3" (host response: HR_1), the host response is changed as follows:

1. The host response for Host-3 is changed from "Default" to "HR_1" (the host response for Host_G3).
2. Since the host response for Host-3 is changed, the host response for Host_G2 to which Host-3 belongs is also changed from "Default" to "HR_1".
   (The host response for Host_2, which is the member host of Host_G2, is changed from "Default" to "HR_1".)
3. Since the host response for Host-2 is changed, the host response for Host_G1 to which Host-2 belongs is also changed from "Default" to "HR_1".
   (The host response for Host_1, which is the member host of Host_G1, is changed from "Default" to "HR_1".)

The following table shows the host response after new hosts are added.

Host group (Host response)	Member host	Host response that is allocated to the host
Host_G1 (HR_1)	Host-1	HR_1
	Host-2	HR_1
Host_G2 (HR_1)	Host-2	HR_1
	Host-3	HR_1
Host_G3 (HR_1)	Host-3	HR_1
	Host-4	HR_1

9.2.2.2 Add iSCSI Host Group

This function creates a new iSCSI host group and registers which hosts are members of this group.
An iSCSI host group uses iSCSI as the interface type, and groups the hosts (HBAs), which access the same LUN group. This function configures Host Affinity settings for each iSCSI host group.

The number of host groups and hosts that can be registered

Model	Number of host groups (*1) per storage system	Number of hosts (HBAs) (*2) per storage system	Number of hosts (HBAs) per CA port	Number of hosts (HBAs) per host group
ETERNUS DX80 S2	128	1024	256	8
ETERNUS DX90 S2				
ETERNUS DX410 S2				
ETERNUS DX440 S2				
ETERNUS DX8100 S2				
ETERNUS DX8700 S2	512	8192		64

*1: The total number of host groups irrespective of the interface types.

*2: The total number of hosts irrespective of the interface types.

Caution

- Registration of the host is necessary to create a host group. Create a new host group when registering a host with GUI by using this function.
- A host can be a member of several host groups. However, only one LUN group can be allocated to host and port combinations when configuring host affinity.
- To assign an appropriate host response to a created host group, refer to "User's Guide -Server Connection-" for each OS type. The host response configures the operation mode that is appropriate for the host.
  If an appropriate host response is not configured to the host group, the path may not be switched correctly or the volume may not be recognized correctly.
- The host response that is specified for a host group is applied all the member hosts in the target group. When a host belongs to multiple host groups, the same host response must be applied for all the groups to which the target host belongs. When a host that already belongs to an existing host group is added to a newly created host group, the host response of the new host group is applied to the host. The host response of the existing host group to which the target host belongs is also changed. Refer to "Example of changing the host response when adding a host group" (page 447) for details.

- Unlike GUI, CLI can register two iSCSI hosts that have the same iSCSI name by setting an IP address for one of these iSCSI hosts and by not setting an IP address for the other iSCSI host. However, if iSCSI hosts are registered in the ETERNUS DX Disk storage system in this way, iSCSI hosts cannot be added using GUI. Avoid this configuration when using GUI and CLI together. If both iSCSI hosts already exist, use CLI to specify an IP address for the iSCSI host without the IP address.
- The name of the [Add iSCSI Host] function, which creates a new iSCSI host group and registers the member hosts has changed with firmware version V10L50. The [Add iSCSI Host] function is now called the [Add iSCSI Host Group] function.

Note

- To change the settings of the host groups, use the procedure in "9.2.2.5 Modify Host Group" (page 463).
- To add a port to an existing host group, use the procedure in "9.2.2.5 Modify Host Group" (page 463).
- To change the iSCSI host information, use the procedure in "9.2.2.16 Modify iSCSI Host" (page 509).

The procedure to create an iSCSI host group is as follows:

Procedure

1 Click [Add iSCSI Host Group] in [Action].

2 Input a host group name to be created, and select a host response to be assigned to the host group.

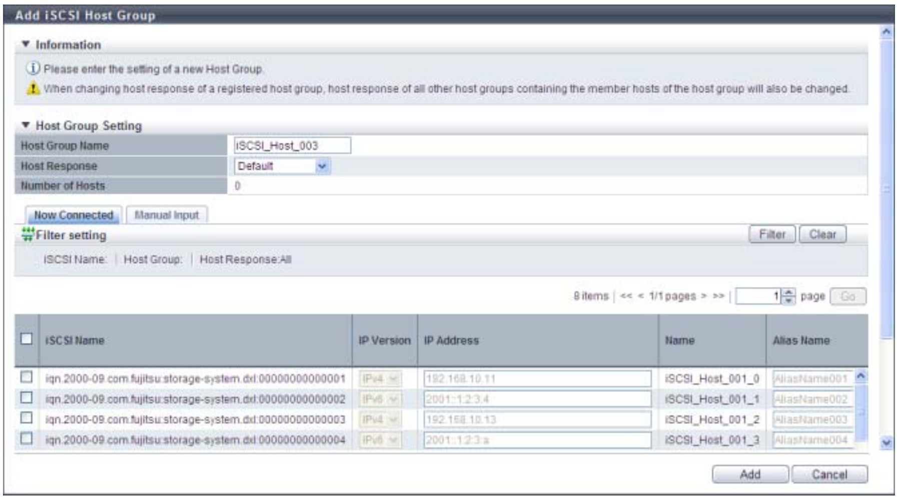
- Host Group Name
  Specify the host group name.
  An existing host group name cannot be specified. Refer to "Naming conventions for adding hosts" (page 994) for details.
  The following input conditions apply:
  - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space
- Host Response
  Select a host response to be assigned to a host group.
  The host response list created in the ETERNUS DX Disk storage system is displayed.
  - Solaris MPxIO
  - HP-UX
  - AIX EMPD (*1)
  - AIX VxVM
  - AIX Single Path
  - VS850/SVC
  - Host responses created in the ETERNUS DX Disk storage system
  - Default

  *1: EMPD: ETERNUS Multipath Driver

Caution

The following modifications are applied for the host response settings with firmware version V10L15 or later.

- "Others" is changed to "Default".
- "Windows EMPD", "Linux EMPD", and "Solaris EMPD" are deleted from the "Host Response" value.
- The setting parameters for "Windows EMPD", "Linux EMPD", and "Solaris EMPD" are the same as "Default".



3 Register a host in a host group in the following procedures, and click the [Add] button.

■ When registering a host by selecting from the host list

(1) Click the [Now Connected] tab.
The following hosts are displayed in the [Now Connected] tab:

- Hosts that are connected to an iSCSI-CA or an iSCSI-CA/RA but are not registered in the ETERNUS DX Disk storage system (*1)

  *1: "Host that is not registered in the ETERNUS DX Disk storage system" indicates that a host with the same iSCSI name, IP version, and Alias Name as the target host is not registered in the storage system. The host is regarded as unregistered host even if a host with the same iSCSI name, IP version, Alias Name, and different IP address is already registered. The obtained "iSCSI Name", "IP Version", "IP Address", and "Alias Name" are displayed.

- Hosts that are connected to an iSCSI-CA or an iSCSI-CA/RA and registered in the ETERNUS DX Disk storage system
- Hosts that are not connected to an iSCSI-CA or an iSCSI-CA/RA but are registered in the ETERNUS DX Disk storage system

Click the [Rediscover] button to update the iSCSI host list.

(2) Select a host to be registered from the iSCSI host list, register the iSCSI host information (the IP address and the Alias name, etc.) to the selected host, and click the [Add] button.

- Checkbox to select a host
  Select the iSCSI host checkbox to be registered in a host group.

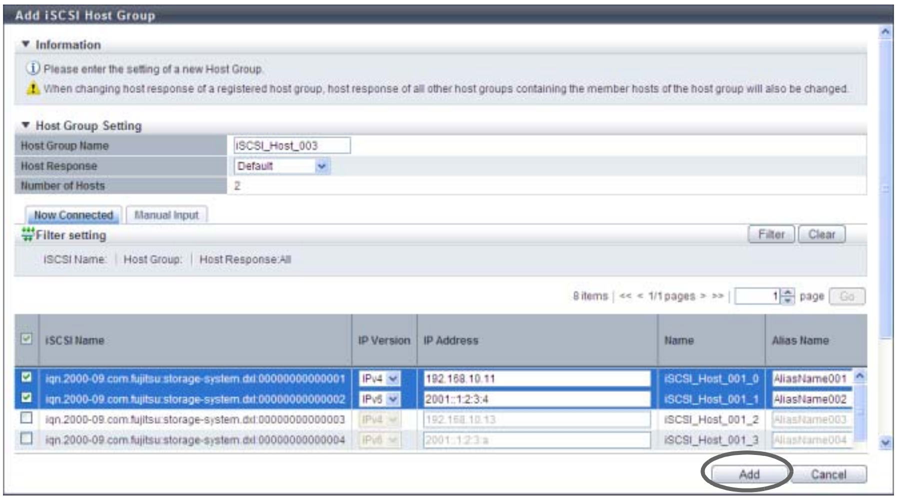
> **Caution**
>
> - If the iSNS server has not been configured in "9.2.3.8 Modify iSCSI Port Parameters" (page 541), the iSCSI host cannot be automatically acquired.
> - The following restrictions in the environment that is described below apply for the automatic acquirement of host information (*1) even when the iSNS server is specified.
>
> *1: "iSCSI Name", "IP Version", "IP Address", and "Alias Name"
>
>   - When one of the following OSs is used and there are multiple hosts that have the same iSCSI name but different IP addresses, only the information of one host can be acquired.
>   - Windows Server 2003
>   - Windows Server 2008
>   - Windows Server 2008 R2
>   - Oracle Solaris 10
>   - When the host OS is Oracle Solaris 11, "IP Version" and "IP Address" cannot be acquired.
> - The following items can be specified only for the iSCSI hosts that are selected by checkboxes; "IP Version", "IP Address", "Alias Name", "CHAP User ID", "Change CHAP Password", "CHAP Password", and "Confirm CHAP Password".

- IP Version
  Select the IP version of the iSCSI host from "IPv4" or "IPv6".

> **Caution**
>
> To register an iSCSI host without using an IP address, perform IP version selection as follows:
>
> - Select "IPv4" when the IP address format of the iSCSI host is IPv4 (when using an IPv4 host)
> - Select "IPv6" when the IP address format of the iSCSI host is IPv6 (when using an IPv6 host)
> - If the IP address format of the iSCSI host cannot be checked (when either an IPv4 host or an IPv6 host is used), register two hosts. Select "IPv4" for one host, and select "IPv6" for the other host. Specify the same iSCSI name, CHAP user ID, and CHAP password for each host.

- IP Address
  Specify the IP address of the member host.
  There are two methods to specify an IP address; "IPv4" and "IPv6". The IP address must be specified with the selected IP version (IPv4 or IPv6). The following IPv6 addresses can be used; "link local address", "global address", "unique local address", and "6to4 address". Refer to "Available IPv6 Address" (page 757) for details. When the current setting is displayed, the IPv6 address is displayed as an abbreviation.
  It is not necessary to specify this item if IP address is not used.
  The following input conditions apply:
  - For IPv4 address
    xxx.xxx.xxx.xxx
    xxx: 0 - 255 for other fields (decimal)
  - For IPv6 address
    xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
    Refer to "IPv6 Address Notation" (page 378) for details.

- Alias Name
  Specify the Alias name of the iSCSI host.
  If the iSCSI host has already been registered in the ETERNUS DX Disk storage system, the Alias name is displayed.
  It is not necessary to specify this item if Alias name is not used.
  An existing Alias name cannot be specified.
  The following input conditions apply:
  - Up to 31 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space
- CHAP User ID
  Specify the user ID for CHAP Authentication.
  If the iSCSI host has already been registered in the ETERNUS DX Disk storage system, the user ID is displayed.
  It is not necessary to specify this item if CHAP Authentication is not used.
  Configure the user ID and the password as a pair.
  The following input conditions apply:
  - Up to 255 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space
- Change CHAP Password
  To register the CHAP Authentication password, select the checkbox.
- CHAP Password
  Specify the password for CHAP Authentication.
  It is not necessary to specify this item if CHAP Authentication is not used.
  Configure the user ID and the password as a pair.
  The password can be entered only when the "Change CHAP Password" checkbox is selected.
  The following input conditions apply:
  - 12 - 100 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space
- Confirm CHAP Password
  Input the CHAP password again for confirmation.
  The password can be entered only when the "Change CHAP Password" checkbox is selected.
  The following input conditions apply:
  - 12 - 100 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space



→ A confirmation screen appears.

Filter setting

Filter	Description
iSCSI Name	Input the iSCSI name that is to be displayed. iSCSI hosts matching or partially matching the input iSCSI name are displayed. When not using the iSCSI name for filtering, leave this item blank.
Host Group	Input the host group name that is to be displayed. iSCSI hosts which belong to any host groups that match or partially match the entered name are displayed. When not using the host group name for filtering, leave this item blank.
Host Response	Select the host response that is to be displayed. Any iSCSI hosts that are allocated to the selected host response are displayed.

Caution

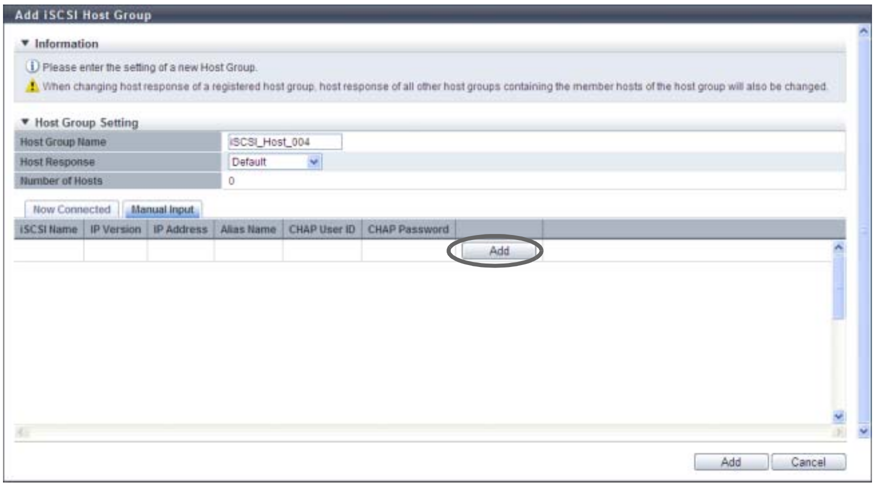
An error screen appears in the following conditions:

- When the "Host Group Name" is not entered
- When the "Host Group Name" does not satisfy the input conditions
- When the "Host Group Name" overlaps with an existing host group name
  (Host group names cannot overlap with any other host group names, irrespective of the interface types.)
- When the "IP Address" does not satisfy the input conditions
- When the "IP Address" is specified and an iSCSI host with the same "iSCSI Name" and "IP Address" is already registered
- When the "IP Address" is not specified and an iSCSI host with the same "iSCSI Name" and "IP Version" is already registered
- When the "Alias Name" does not satisfy the input conditions
- When the "Alias Name" overlaps the existing Alias name
- When the "CHAP User ID" does not satisfy the input conditions
- When the "CHAP Password" does not satisfy the input conditions
- When the "Confirm CHAP Password" does not satisfy the input conditions
- When the "CHAP Password" and the "Confirm CHAP Password" do not match
- When either of the "CHAP User ID" or the "CHAP Password" has been specified
- When no hosts are registered in a host group, or when nine or more hosts are registered in a host group (for ETERNUS DX8700 S2, 65 or more hosts are registered in a host group)
- When the total number of host groups has exceeded the maximum number for the ETERNUS DX Disk storage system
- When the total number of hosts has exceeded the maximum number for the ETERNUS DX Disk storage system

■ When registering a host by manually specifying the host

(1) Click the [Manual Input] tab.

(2) Click the [Add] button.



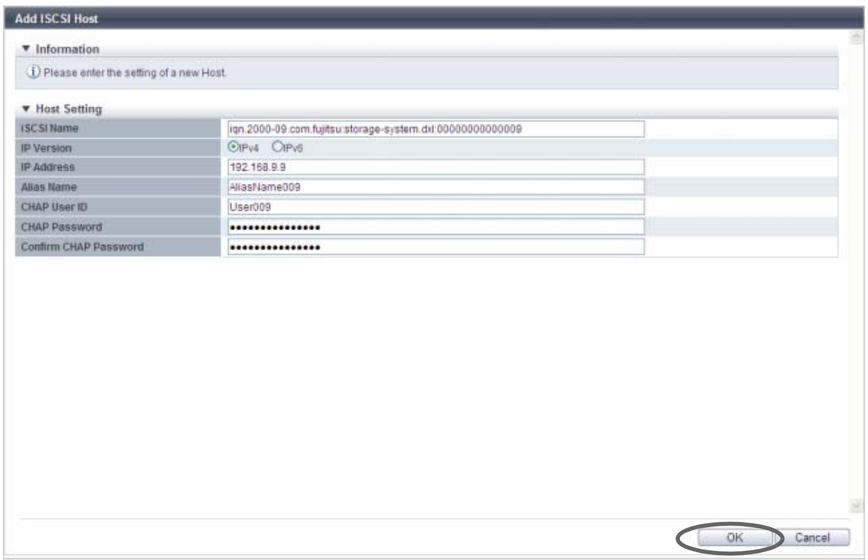
→ The [Add iSCSI Host] screen appears.

(3) Specify the iSCSI host information of the host to be registered, and click the [OK] button.

- iSCSI Name
  Specify an iSCSI name of the iSCSI host (required).
  The following input conditions apply:
  - Alphabetic characters (lower case) and numeric characters
  - Symbols "-" (hyphen), "." (period) and ":" (colon)
  - The name starts with "iqn." or "eui."
  - 4 - 223 characters

Note

Refer to Step (2) (page 451) for other settings.



→ Returns to the [Manual Input] screen.

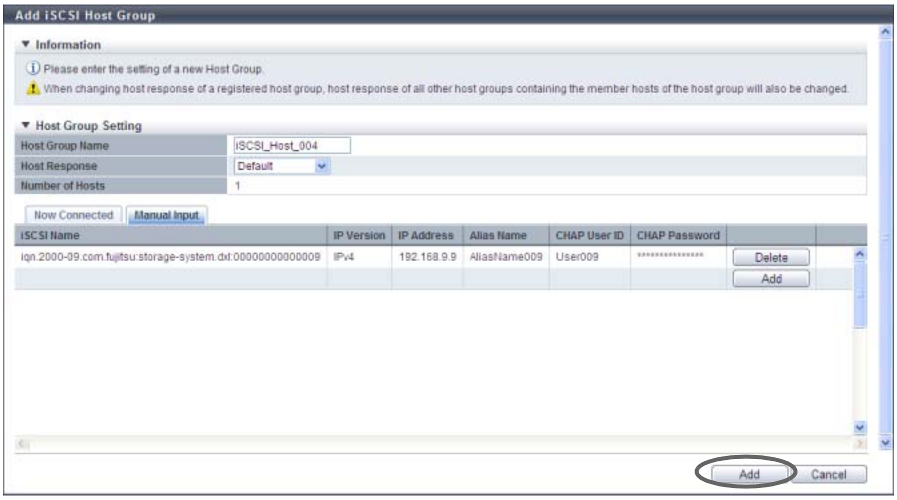
Caution

An error screen appears in the following conditions:

- When the "iSCSI Name" is not input
- When the "iSCSI Name" does not satisfy the input conditions
- When the "IP Address" does not satisfy the input conditions
- When the "Alias Name" does not satisfy the input conditions
- When the "CHAP User ID" does not satisfy the input conditions
- When the "CHAP Password" does not satisfy the input conditions
- When the "Confirm CHAP Password" does not satisfy the input conditions
- When the "CHAP Password" and the "Confirm CHAP Password" do not match
- When either of the "CHAP User ID" or the "CHAP Password" has been specified

(4) Repeat Step (2) and Step (3) to set more iSCSI hosts.

(5) After adding the iSCSI host is complete, click the [Add] button.



→ A confirmation screen appears.

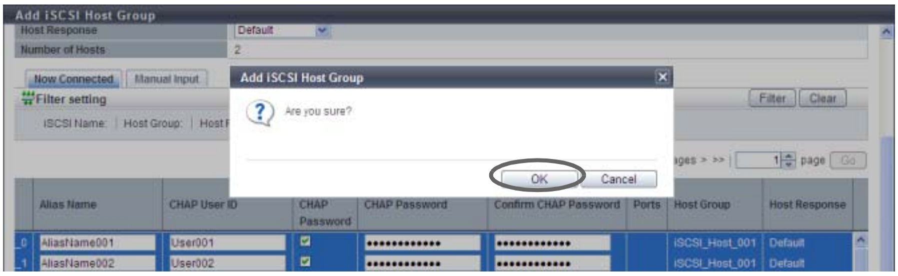
Caution

An error screen appears in the following conditions:

- When the "Host Group Name" is not entered
- When the "Host Group Name" does not satisfy the input conditions
- When the "Host Group Name" overlaps with an existing host group name
  (Host group names cannot overlap with any other host group names, irrespective of the interface types.)
- When the "IP Address" is specified and an iSCSI host with the same "iSCSI Name" and "IP Address" is already registered
- When the "IP Address" is not specified and an iSCSI host with the same "iSCSI Name" and "IP Version" is already registered
- When the same iSCSI name is specified for multiple iSCSI hosts
- When the "Alias Name" overlaps the existing Alias name

- When no hosts are registered in a host group, or when nine or more hosts are registered in a host group (for ETERNUS DX8700 S2, 65 or more hosts are registered in a host group)
- When the total number of host groups has exceeded the maximum number for the ETERNUS DX Disk storage system
- When the total number of hosts has exceeded the maximum number for the ETERNUS DX Disk storage system

4 Click the [OK] button.



→ Registration of the iSCSI host group starts.

5 Click the [Done] button to return to the [Host Group] screen.

Note

Click the [Continue] button to continue adding iSCSI hosts.

End of procedure

9.2.2.3 Add SAS Host Group

This function creates a new SAS host group and registers which hosts are members of this group.
A SAS host group uses SAS as the interface type, and groups the hosts (HBAs), which access the same LUN group. This function configures Host Affinity settings for each SAS host group.

The number of host groups and hosts that can be registered

Model	Number of host groups (*1) per storage system	Number of hosts (HBAs) (*2) per storage system	Number of hosts (HBAs) per CA port	Number of hosts (HBAs) per host group
ETERNUS DX80 S2	128	1024	256	8
ETERNUS DX90 S2				

*1: The total number of host groups irrespective of the interface types.
*2: The total number of hosts irrespective of the interface types.

Caution

- Registration of the host is necessary to create a host group. Create a new host group when registering a host with GUI by using this function.
- A host can be a member of several host groups. However, only one LUN group can be allocated to host and port combinations when configuring host affinity.
- To assign an appropriate host response to a created host group, refer to "User's Guide -Server Connection-" for each OS type. The host response configures the operation mode that is appropriate for the host.
  If an appropriate host response is not configured to the host group, the path may not be switched correctly or the volume may not be recognized correctly.
- The host response that is specified for a host group is applied all the member hosts in the target group. When a host belongs to multiple host groups, the same host response must be applied for all the groups to which the target host belongs. When a host that already belongs to an existing host group is added to a newly created host group, the host response of the new host group is applied to the host. The host response of the existing host group to which the target host belongs is also changed. Refer to "Example of changing the host response when adding a host group" (page 447) for details.
- The name of the [Add SAS Host] function, which creates a new SAS host group and registers the member hosts has changed with firmware version V10L50. The [Add SAS Host] function is now called the [Add SAS Host Group] function.

Note

- To change the settings of the host groups, use the procedure in "9.2.2.5 Modify Host Group" (page 463).
- To add a port to an existing host group, use the procedure in "9.2.2.5 Modify Host Group" (page 463).
- To change the host name or the SAS address, use the procedure in "9.2.2.17 Modify SAS Host" (page 514).

The procedure to create a SAS host group is as follows:

Procedure

1 Click [Add SAS Host Group] in [Action].

2 Input a host group name to be created, and select a host response to be assigned to the host group.

- Host Group Name
  Specify the host group name.
  An existing host group name cannot be specified. Refer to "Naming conventions for adding hosts" (page 994) for details.
  The following input conditions apply:
  - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space

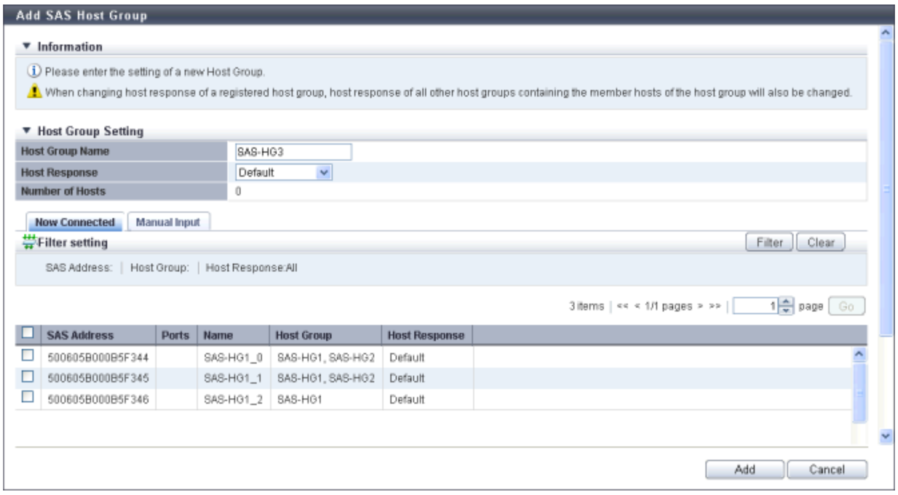
- Host Response
  Select a host response to be assigned to a host group.
  The host response list created in the ETERNUS DX Disk storage system is displayed.
  - Solaris MPxIO
  - HP-UX
  - AIX EMPD (*1)
  - AIX VxVM
  - AIX Single Path
  - VS850/SVC
  - Host responses created in the ETERNUS DX Disk storage system
  - Default

  *1: EMPD: ETERNUS Multipath Driver

Caution

The following modifications are applied for the host response settings with firmware version V10L15 or later.

- "Others" is changed to "Default".
- "Windows EMPD", "Linux EMPD", and "Solaris EMPD" are deleted from the "Host Response" value.
- The setting parameters for "Windows EMPD", "Linux EMPD", and "Solaris EMPD" are the same as "Default".



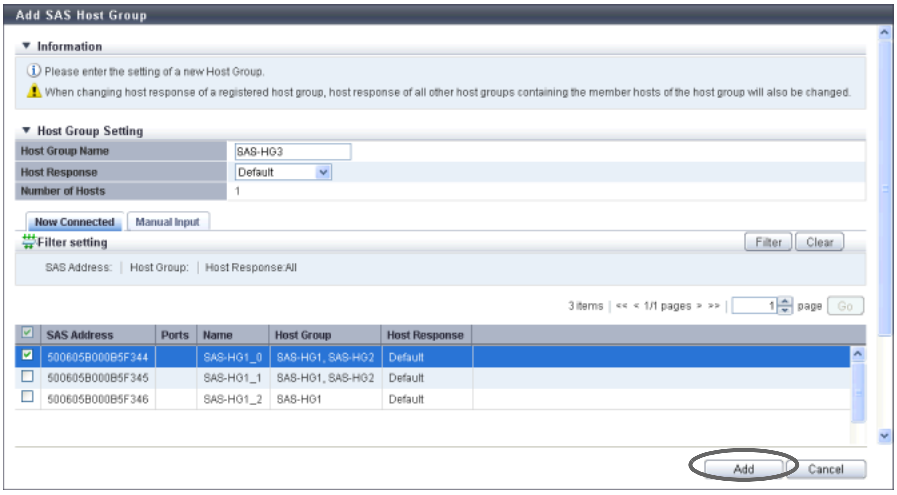
3 Register a host in a host group in the following procedures.

■ When registering a host by selecting from the host list

(1) Click the [Now Connected] tab.

(2) Select a host to be registered from the SAS host list, and click the [Add] button.

- Checkbox to select a host
  Select the SAS host checkbox to be registered in a host group.



→ A confirmation screen appears.

Filter setting

Filter	Description
SAS Address	Input the SAS address to be displayed. SAS hosts matching or partially matching the input SAS address are displayed. When not using the SAS address for filtering, leave this item blank.
Host Group	Input the host group name that is to be displayed. SAS hosts which belong to any host groups that match or partially match the entered name are displayed. When not using the host group name for filtering, leave this item blank.
Host Response	Select the host response name that is to be displayed. Any SAS hosts that are allocated to the selected host response are displayed.

Caution

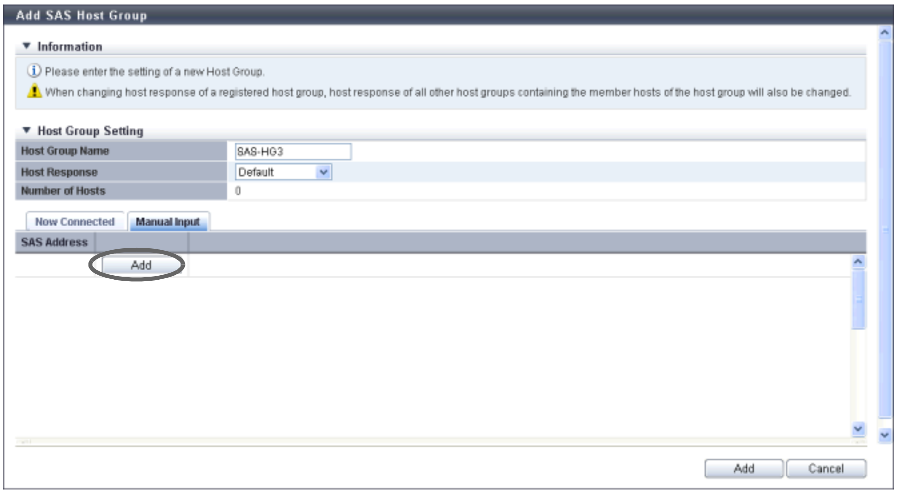
An error screen appears in the following conditions:

- When the "Host Group Name" is not entered
- When the "Host Group Name" does not satisfy the input conditions
- When the "Host Group Name" overlaps with an existing host group name
  (Host group names cannot overlap with any other host group names, irrespective of the interface types.)
- When no hosts are registered in a host group, or when nine or more hosts are registered in a host group
- When the total number of host groups has exceeded the maximum number for the ETERNUS DX Disk storage system
- When the total number of hosts has exceeded the maximum number for the ETERNUS DX Disk storage system

■ When registering a host by manually specifying the host

(1) Click the [Manual Input] tab.

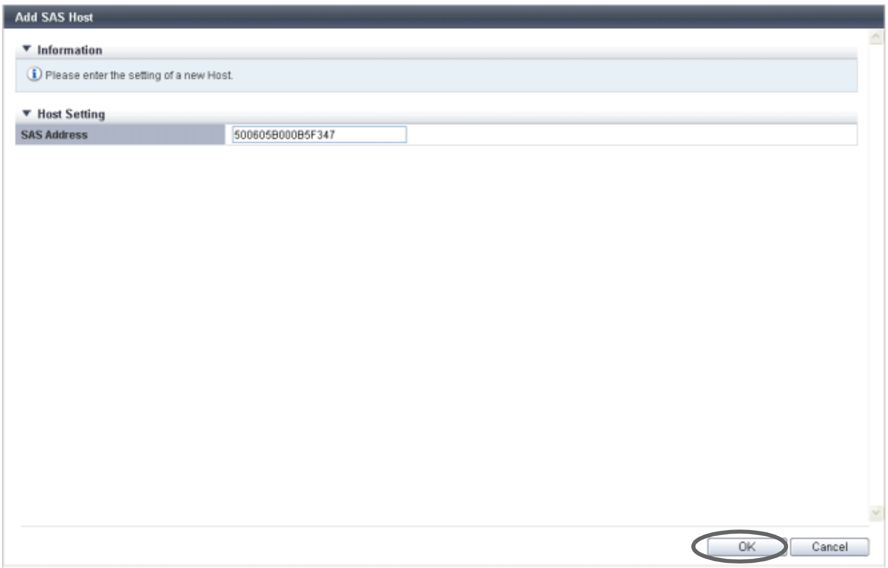
(2) Click the [Add] button.



→ The [Add SAS Host] screen appears.

(3) Manually specify the SAS address of the host to be registered, and click the [OK] button.

- SAS Address
  Specify the SAS address of the SAS host.
  The following input conditions apply:
  - 16 hexadecimal numbers
  - "F (f)" or "0" used in entire 16 characters are not allowed.



→ Returns to the [Manual Input] screen.

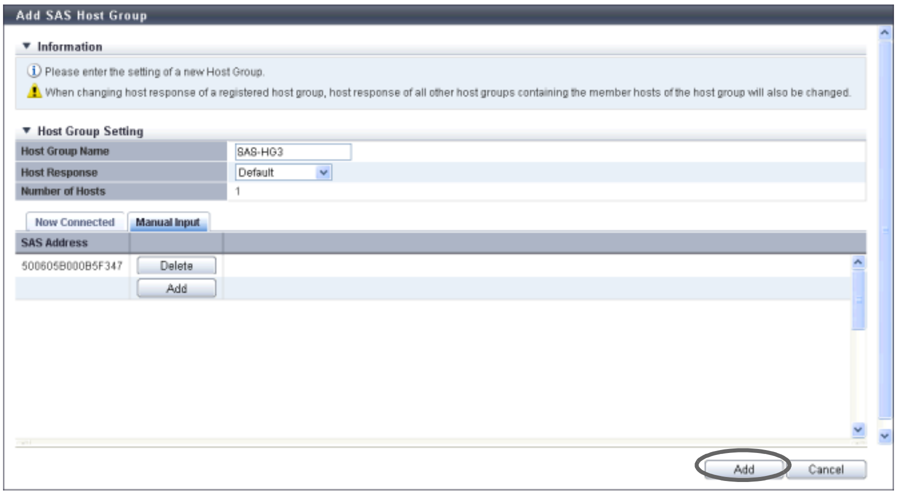
Caution

An error screen appears in the following conditions:

- When the "SAS Address" is not input
- When the "SAS Address" does not satisfy the input conditions

(4) Repeat Step (2) and Step (3) to set more SAS addresses.

(5) After adding the SAS host is complete, click the [Add] button.



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When the "Host Group Name" is not entered
- When the "Host Group Name" does not satisfy the input conditions
- When the "Host Group Name" overlaps with an existing host group name
  (Host group names cannot overlap with any other host group names, irrespective of the interface types.)
- When the several SAS hosts with the same SAS addresses have been registered
- When no hosts are registered in a host group, or when nine or more hosts are registered in a host group
- When the total number of host groups has exceeded the maximum number for the ETERNUS DX Disk storage system
- When the total number of hosts has exceeded the maximum number for the ETERNUS DX Disk storage system

4 Click the [OK] button.



→ Registration of the SAS host group starts.

5 Click the [Done] button to return to the [Host Group] screen.

Note

Click the [Continue] button to continue adding SAS hosts.

End of procedure

9.2.2.4 Delete Host Group

This function deletes a host group. When a host group is deleted, the hosts, which belong to the host group, are also deleted.

Caution

The host group, of which host affinity settings have been configured, cannot be deleted.

The procedure to delete a host group is as follows:

Procedure

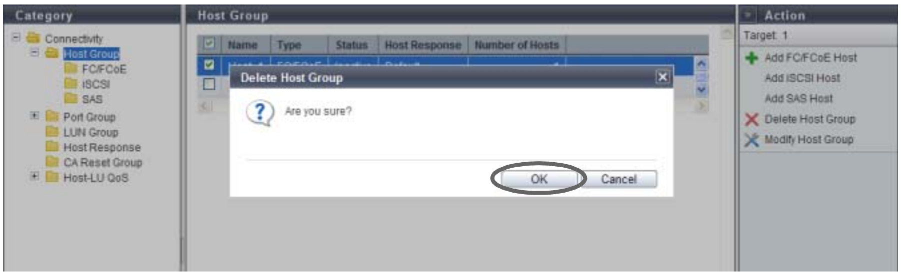
1 Select the host group to be deleted (multiple selections can be made) and click [Delete Host Group] in [Action].

→ A confirmation screen appears.

Caution

The host group, of which host affinity settings have been configured (the status of the host group is "Active"), cannot be deleted.

2 Click the [OK] button.



→ Deletion of the host group starts.

3 Click the [Done] button to return to the [Host Group] screen.

End of procedure

9.2.2.5 Modify Host Group

This function performs the following modifications to the existing host group.

- Changing the "Host Group Name" settings
- Changing the "Host Response" settings
- Changing the "Host" settings (including addition and deletion of member hosts in a host group)

Operation screens for modifying host groups vary with the interface types.

- Refer to "9.2.2.6 Modify Host Group (FC/FCoE)" (page 463) to edit FC/FCoE host groups.
- Refer to "9.2.2.7 Modify Host Group (iSCSI)" (page 470) to edit iSCSI host groups.
- Refer to "9.2.2.8 Modify Host Group (SAS)" (page 480) to edit SAS host groups.

9.2.2.6 Modify Host Group (FC/FCoE)

This function performs the following modifications to the existing FC/FCoE host group.

- Changing the "Host Group Name" settings
- Changing the "Host Response" settings
- Changing the "Host" settings (including addition and deletion of member hosts in a host group)

Hosts can be added to host groups which the host affinity setting has been already configured, or deleted from host groups.
If a host is added, the host affinity setting is automatically configured to the host, as a host group member.
If a host is deleted, the host affinity setting is cleared from the corresponding host.

The number of hosts that can be registered

Model	Number of hosts (HBAs) (*1) per storage system	Number of hosts (HBAs) per CA port	Number of hosts (HBAs) per host group
ETERNUS DX80 S2	1024	256	8
ETERNUS DX90 S2			
ETERNUS DX410 S2			
ETERNUS DX440 S2			
ETERNUS DX8100 S2			
ETERNUS DX8700 S2	8192		64

*1: The total number of hosts irrespective of the interface types.

Caution

- Registration of the host is necessary to create a host group. It is not possible to delete all hosts from a host group.
- A host that has been registered with GUI by using this function belongs to one of the host groups.
- A host can be a member of several host groups. However, only one LUN group can be allocated to host and port combinations when configuring host affinity.
- To assign an appropriate host response to a created host group, refer to "User's Guide -Server Connection-" for each OS type. The host response configures the operation mode that is appropriate for the host. If an appropriate host response is not configured to the host group, the path may not be switched correctly or the volume may not be recognized correctly.
- The host response that is specified for a host group is applied all the member hosts in the target group. When a host belongs to multiple host groups, the same host response must be applied for all the groups to which the target host belongs. When a host that already belongs to an existing host group is added to another host group, the host response of the target host is changed to the host response of the host group to which the target host is added. The host response of the existing host group to which the target host belongs is also changed. Refer to "Example of changing the host response when adding a host to an existing host group" (page 447) for details.
- When changing the host response for the host group, the host responses of the other host groups to which the target host belongs are also changed.

Note

- When a host was added to a host group, of which the host affinity setting has been configured, paths between all the ports with the host affinity setting and the added host will be configured. To modify the path between a host and a port, refer to "9.2.1.3 Modify Host Affinity" (page 428).
- When a host in the host group for which the host affinity settings are already configured is deleted, the path from the host to the port is also deleted.
- To change the host name or WWN, use the procedure in "9.2.2.15 Modify FC/FCoE Host" (page 507).
- To create a new host group and register hosts, use the procedure in "9.2.2.1 Add FC/FCoE Host Group" (page 440).
- An FC host and an FCoE host can be members of the same host group. Both "FC host" and "FCoE host" are abbreviated as "FC host" in this section.

The procedure to edit an FC host group is as follows:

Procedure

1 Select the FC host group to be changed, and click [Modify Host Group] in [Action].

2 Input a new host group name, or re-select a host response to be assigned to the host group.

● Host Group Setting

- Host Group Name
  Specify the host group name.
  An existing host group name cannot be specified. Refer to "Naming conventions for adding hosts" (page 994) for details.
  The following input conditions apply:
  - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space
- Host Response
  Select a host response to be assigned to a host group.
  The host response list created in the ETERNUS DX Disk storage system is displayed.
  - Solaris MPxIO
  - HP-UX
  - AIX EMPD (*1)
  - AIX VxVM
  - AIX Single Path
  - VS850/SVC
  - Host responses created in the ETERNUS DX Disk storage system
  - Default

  *1: EMPD: ETERNUS Multipath Driver

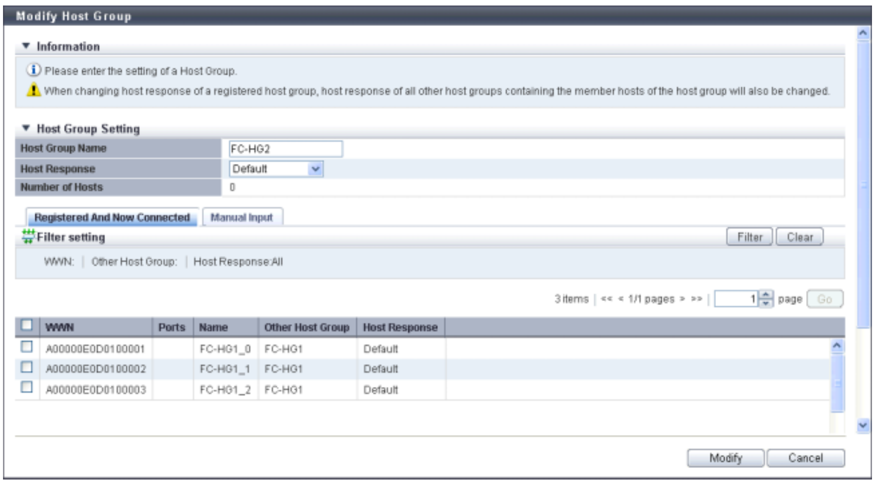
Caution

- If the host response is changed for a host group that is configured with the host affinity setting, the LUNs may not be able to be accessed from the host. Make sure to check the current LUN settings and select a host response with an appropriate "Host Specific Mode" to change the host response.

LUN settings for LUN groups with host affinity settings	Host Specific Mode				
	Normal	AIX Mode	NR1000V Mode	HP-UX Mode	BS2000 Mode
LUN#0 – LUN#255	Available	Available	Available	Available	Available
LUN#0 - LUN#511	N/A	Available	Available	Available	Available
LUN#0 - LUN#1023	N/A	N/A	N/A	Available	Available
LUN#0 - LUN#4095	N/A	N/A	N/A	N/A	Available

Available: The host can recognize LUNs
N/A: The host cannot recognize some LUNs

- The following modifications are applied for the host response settings with firmware version V10L15 or later.
  - "Others" is changed to "Default".
  - "Windows EMPD", "Linux EMPD", and "Solaris EMPD" are deleted from the "Host Response" value. However, these parameters are displayed if they are applied for host groups.
  - The setting parameters for "Windows EMPD", "Linux EMPD", and "Solaris EMPD" are the same as "Default". If one of the host responses that is described here is applied to a host group, change the setting to "Default".



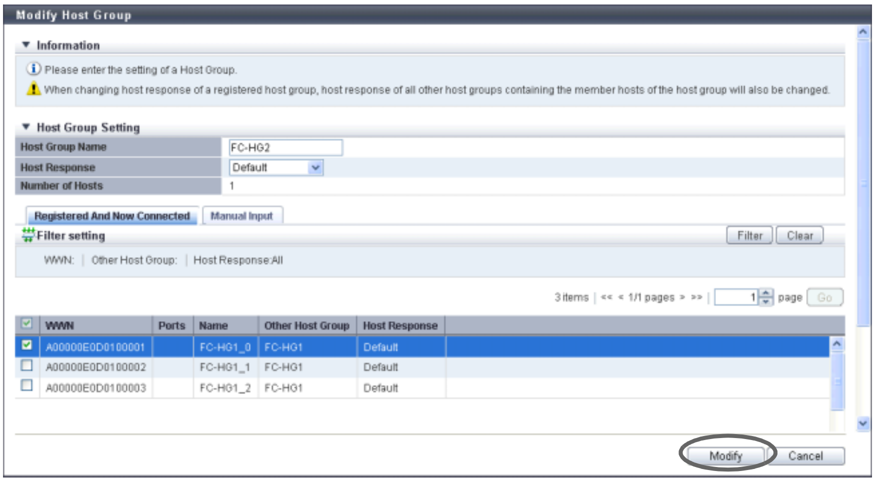
3 Add or delete a host in a host group in the following procedures.

■ When adding or deleting a host by selecting from the host list

(1) Click the [Registered And Now Connected] tab.

(2) Add or delete hosts, and click the [Modify] button.

- Checkbox to select a host
  Select the corresponding host checkbox in the FC host list, to add a host.
  Clear the corresponding host checkbox in the FC host list, to delete a host.



→ A confirmation screen appears.

Filter setting

Filter	Description
WWN	Input the WWN that is to be displayed. FC hosts matching or partially matching the input WWN are displayed. When not using the WWN for filtering, leave this item blank.
Other Host Group	Input the other host group name that is to be displayed. FC hosts which belong to any host groups that match or partially match the entered name are displayed. When not using the host group name for filtering, leave this item blank.
Host Response	Select the host response that is to be displayed. Any FC hosts that are allocated to the selected host response are displayed.

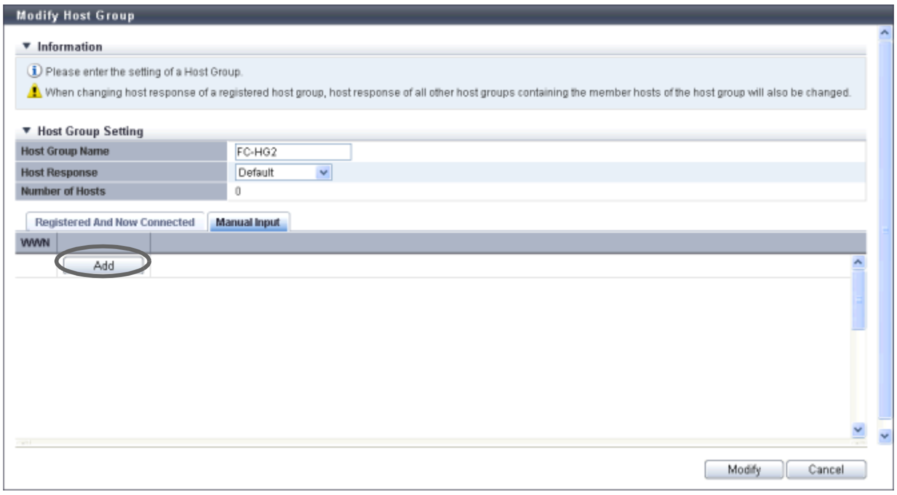
Caution

- If the WWN is not displayed when clicking the [Rediscover] button, make sure that there is no error in the connection environment, such as the connection between the host and the switch, and the CA port settings of the ETERNUS DX Disk storage system. If there is no error in the connection environment, contact the Support Department, or specify the WWN manually.
- An error screen appears in the following conditions:
  - When the "Host Group Name" is not entered
  - When the "Host Group Name" does not satisfy the input conditions
  - When the "Host Group Name" overlaps with an existing host group name (Host group names cannot overlap with any other host group names, irrespective of the interface types.)
  - When a host cannot recognize some LUNs
  - When no hosts are registered in a host group, or when nine or more hosts are registered in a host group (for ETERNUS DX8700 S2, 65 or more hosts are registered in a host group)
  - When the total number of hosts has exceeded the maximum number for the ETERNUS DX Disk storage system

■ When adding a host by manually specifying the host

(1) Click the [Manual Input] tab.

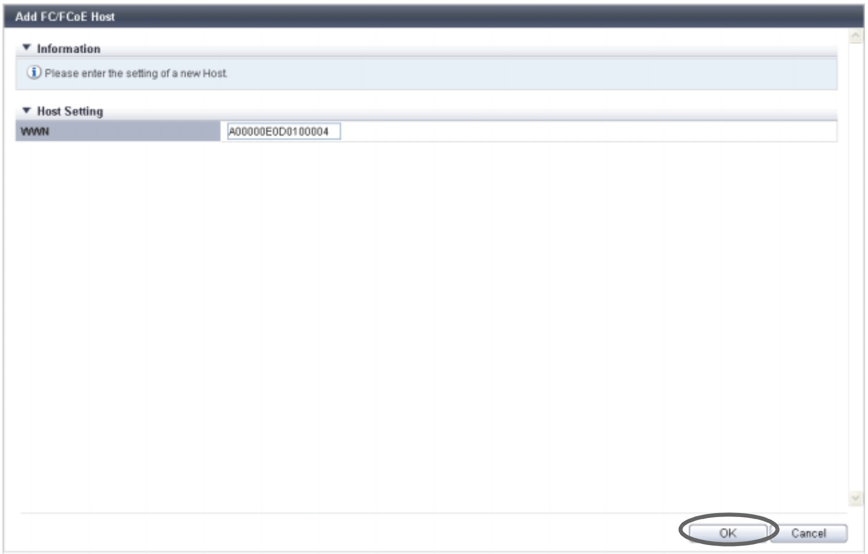
(2) Click the [Add] button.



→ The [Add FC/FCoE Host] screen appears.

(3) Manually specify the WWN of the host to be added, and click the [OK] button.

- WWN
  Input the WWN for the FC host.
  The following input conditions apply:
  - Hexadecimal numbers (0 - 9, A - F, a - f)
  - 16 characters
  - "F (f)" or "0" used in entire 16 characters are not allowed.



→ Returns to the [Manual Input] screen.

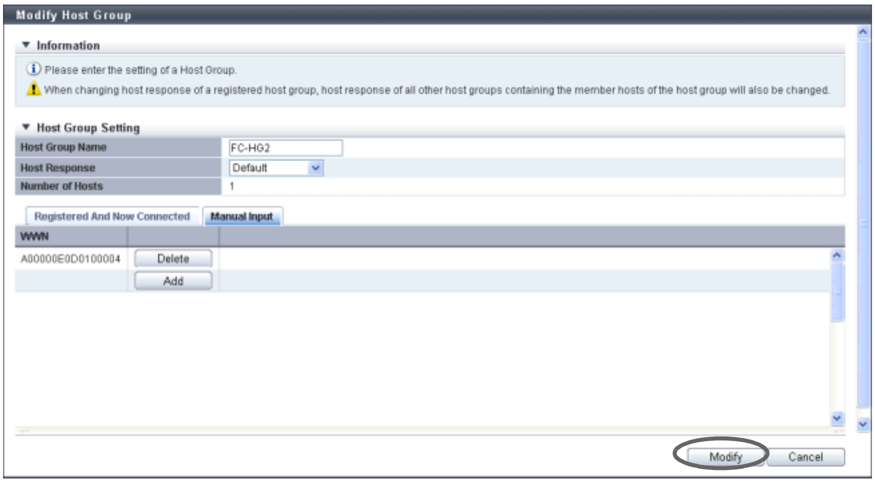
Caution

An error screen appears in the following conditions:

- When the "WWN" is not input
- When the "WWN" does not satisfy the input conditions

(4) Repeat Step (2) and Step (3) to set more WWNs.

(5) After adding or deleting FC hosts is complete, click the [Modify] button.



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When the "Host Group Name" is not entered
- When the "Host Group Name" does not satisfy the input conditions
- When the "Host Group Name" overlaps with an existing host group name
  (Host group names cannot overlap with any other host group names, irrespective of the interface types.)
- When the several FC hosts with the same WWNs have been registered
- When a host cannot recognize some LUNs
- When no hosts are registered in a host group, or when nine or more hosts are registered in a host group (for ETERNUS DX8700 S2, 65 or more hosts are registered in a host group)
- When the total number of hosts has exceeded the maximum number for the ETERNUS DX Disk storage system

4 Click the [OK] button.



→ Modification of the FC host group starts.

5 Click the [Done] button to return to the [Host Group] screen.

End of procedure

9.2.2.7 Modify Host Group (iSCSI)

This function performs the following modifications to the existing iSCSI host group.

- Changing the "Host Group Name" settings
- Changing the "Host Response" settings
- Changing the "Host" settings (including addition and deletion of member hosts in a host group)

Hosts can be added to host groups which the host affinity setting has been already configured, or deleted from host groups.
If a host is added, the host affinity setting is automatically configured to the host, as a host group member.
If a host is deleted, the host affinity setting is cleared from the corresponding host.

The number of hosts that can be registered

Model	Number of hosts (HBAs) (*1) per storage system	Number of hosts (HBAs) per CA port	Number of hosts (HBAs) per host group
ETERNUS DX80 S2	1024	256	8
ETERNUS DX90 S2			
ETERNUS DX410 S2			
ETERNUS DX440 S2			
ETERNUS DX8100 S2			
ETERNUS DX8700 S2	8192		64

*1: The total number of hosts irrespective of the interface types.

Caution

- Registration of the host is necessary to create a host group. It is not possible to delete all hosts from a host group.
- A host that has been registered with GUI by using this function belongs to one of the host groups.
- A host can be a member of several host groups. However, only one LUN group can be allocated to host and port combinations when configuring host affinity.
- To assign an appropriate host response to a created host group, refer to "User's Guide -Server Connection-" for each OS type. The host response configures the operation mode that is appropriate for the host. If an appropriate host response is not configured to the host group, the path may not be switched correctly or the volume may not be recognized correctly.
- The host response that is specified for a host group is applied all the member hosts in the target group. When a host belongs to multiple host groups, the same host response must be applied for all the groups to which the target host belongs. When a host that already belongs to an existing host group is added to another host group, the host response of the target host is changed to the host response of the host group to which the target host is added. The host response of the existing host group to which the target host belongs is also changed. Refer to "Example of changing the host response when adding a host to an existing host group" (page 447) for details.
- When changing the host response for the host group, the host responses of the other host groups to which the target host belongs are also changed.
- Unlike GUI, CLI can register two iSCSI hosts that have the same iSCSI name by setting an IP address for one of these iSCSI hosts and by not setting an IP address for the other iSCSI host. However, if iSCSI hosts are registered in the ETERNUS DX Disk storage system in this way, iSCSI host settings cannot be changed using GUI. Avoid this configuration when using GUI and CLI together. If both iSCSI hosts already exist, use CLI to specify an IP address for the iSCSI host without the IP address.

Note

- When a host was added to a host group, of which the host affinity setting has been configured, paths between all the ports with the host affinity setting and the added host will be configured. To modify the path between a host and a port, refer to "9.2.1.3 Modify Host Affinity" (page 428).
- When a host in the host group for which the host affinity settings are already configured is deleted, the path from the host to the port is also deleted.
- To change the iSCSI host information, use the procedure in "9.2.2.16 Modify iSCSI Host" (page 509).
- To create a new host group and register hosts, use the procedure in "9.2.2.2 Add iSCSI Host Group" (page 448).

The procedure to edit an iSCSI host group is as follows:

Procedure

1. Select the iSCSI host group to be changed, and click [Modify Host Group] in [Action].
2. Input a new host group name, or re-select a host response to be assigned to the host group.

● Host Group Setting

- Host Group Name
  Specify the host group name.
  An existing host group name cannot be specified. Refer to "Naming conventions for adding hosts" (page 994) for details.
  The following input conditions apply:
  - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space
- Host Response
  Select a host response to be assigned to a host group.
  The host response list created in the ETERNUS DX Disk storage system is displayed.
  - Solaris MPxIO
  - HP-UX
  - AIX EMPD (*1)
  - AIX VxVM
  - AIX Single Path
  - VS850/SVC
  - Host responses created in the ETERNUS DX Disk storage system
  - Default

  *1: EMPD: ETERNUS Multipath Driver

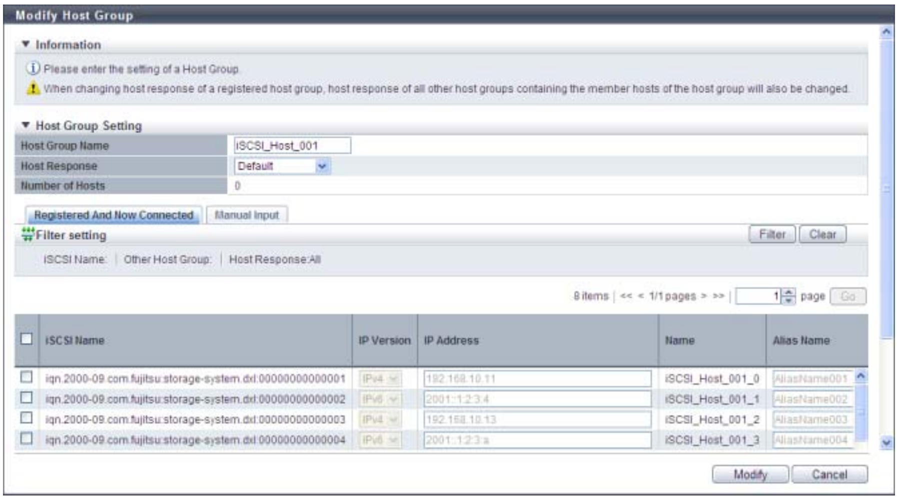
Caution

- If the host response is changed for a host group that is configured with the host affinity setting, the LUNs may not be able to be accessed from the host. Make sure to check the current LUN settings and select a host response with an appropriate "Host Specific Mode" to change the host response.

LUN settings for LUN groups with host affinity settings	Host Specific Mode				
	Normal	AIX Mode	NR1000V Mode	HP-UX Mode	BS2000 Mode
LUN#0 – LUN#255	Available	Available	Available	Available	Available
LUN#0 - LUN#511	N/A	Available	Available	Available	Available
LUN#0 - LUN#1023	N/A	N/A	N/A	Available	Available
LUN#0 - LUN#4095	N/A	N/A	N/A	N/A	Available

Available: The host can recognize LUNs
N/A: The host cannot recognize some LUNs

- The following modifications are applied for the host response settings with firmware version V10L15 or later.
  - "Others" is changed to "Default".
  - "Windows EMPD", "Linux EMPD", and "Solaris EMPD" are deleted from the "Host Response" value. However, these parameters are displayed if they are applied for host groups.
  - The setting parameters for "Windows EMPD", "Linux EMPD", and "Solaris EMPD" are the same as "Default". If one of the host responses that is described here is applied to a host group, change the setting to "Default".



3 Add or delete a host in a host group in the following procedures.

■ When adding or deleting a host by selecting from the host list

(1) Click the [Registered And Now Connected] tab.
The following hosts are displayed in the [Registered And Now Connected] tab:

- Hosts that belong to the selected host group
- Hosts that are connected to an iSCSI-CA or an iSCSI-CA/RA but are not registered in the ETERNUS DX Disk storage system (*1)

  *1: "Host that is not registered in the ETERNUS DX Disk storage system" indicates that a host with the same iSCSI name, IP version, and Alias Name as the target host is not registered in the storage system. The host is regarded as unregistered host even if a host with the same iSCSI name, IP version, Alias Name, and different IP address is already registered. The obtained "iSCSI Name", "IP Version", "IP Address", and "Alias Name" are displayed.

- Hosts that are registered in the ETERNUS DX Disk storage system but do not belong to the host group
- Hosts that are registered in the ETERNUS DX Disk storage system and belong to the host group

Click the [Rediscover] button to update the iSCSI host list.

(2) Add or delete iSCSI hosts, register the iSCSI host information (the IP address and the Alias name, etc.) to the added host, and click the [Modify] button.

- Checkbox to select a host
  Select the corresponding host checkbox in the iSCSI host list, to add a host.
  Clear the corresponding host checkbox in the iSCSI host list, to delete a host.

Caution

- If the iSNS server has not been configured in "9.2.3.8 Modify iSCSI Port Parameters" (page 541), the iSCSI host cannot be automatically acquired.
- The following restrictions in the environment that is described below apply for the automatic acquirement of host information (*1) even when the iSNS server is specified.

  *1: "iSCSI Name", "IP Version", "IP Address", and "Alias Name"

  - When one of the following OSs is used and there are multiple hosts that have the same iSCSI name but different IP addresses, only the information of one host can be acquired.
    - Windows Server 2003
    - Windows Server 2008
    - Windows Server 2008 R2
    - Oracle Solaris 10
  - When the host OS is Oracle Solaris 11, "IP Version" and "IP Address" cannot be acquired.
- The following items can be specified only for the iSCSI hosts that are selected by checkboxes; "IP Version", "IP Address", "Alias Name", "CHAP User ID", "Change CHAP Password", "CHAP Password", and "Confirm CHAP Password".

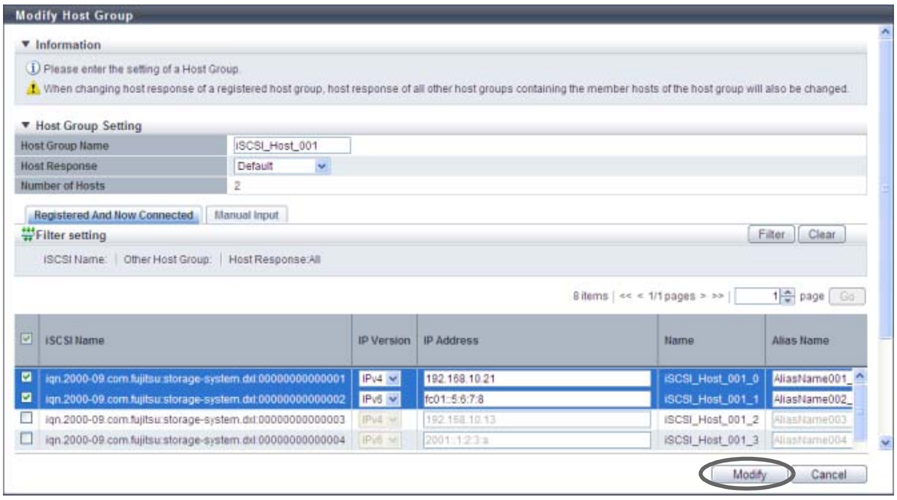
- IP Version
  Select the IP version of the iSCSI host from "IPv4" and "IPv6".

Caution

To register an iSCSI host without using an IP address, perform IP version selection as follows:
- Select "IPv4" when the IP address format of the iSCSI host is IPv4 (when using an IPv4 host)
- Select "IPv6" when the IP address format of the iSCSI host is IPv6 (when using an IPv6 host)
- If the IP address format of the iSCSI host cannot be checked (when either an IPv4 host or an IPv6 host is used), register two hosts. Select "IPv4" for one host, and select "IPv6" for the other host. Specify the same iSCSI name, CHAP user ID, and CHAP password for each host.

- IP Address
  Specify the IP address of the iSCSI host.
  There are two methods to specify an IP address; "IPv4" and "IPv6". The IP address must be specified with the selected IP version (IPv4 or IPv6). The following IPv6 addresses can be used; "link local address", "global address", "unique local address", and "6to4 address". Refer to "Available IPv6 Address" (page 757) for details. When the current setting is displayed, the IPv6 address is displayed as an abbreviation.
  It is not necessary to specify this item if IP address is not used.
  The following input conditions apply:
  - For IPv4 address
    xxx.xxx.xxx.xxx
    xxx: 1 - 255 for the top field (decimal)
    xxx: 0 - 255 for other fields (decimal)
  - For IPv6 address
    xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
    Refer to "IPv6 Address Notation" (page 378) for details.
- Alias Name
  The Alias name of the member host is displayed.
  To add an iSCSI host to a host group, select the checkbox of the iSCSI host to be added, and enter the Alias name.
  If the iSCSI host has already been registered in the ETERNUS DX Disk storage system, the Alias name is displayed.
  It is not necessary to specify this item if Alias name is not used.
  An existing Alias name cannot be specified.
  The following input conditions apply:
  - Up to 31 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space
- CHAP User ID
  The user ID of the member host, for which CHAP Authentication will be used, is displayed.
  To use CHAP Authentication on the iSCSI host to be added, select the checkbox of the iSCSI host, and enter the user ID.
  If the iSCSI host has already been registered in the ETERNUS DX Disk storage system, the user ID is displayed.
  It is not necessary to specify this item if CHAP Authentication is not used.
  Configure the user ID and the password as a pair.
  The following input conditions apply:
  - Up to 255 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space

- Change CHAP Password
  To register or change the CHAP Authentication password, select the checkbox.
- CHAP Password
  The password for the member host, on which CHAP Authentication will be used, is displayed with "*".
  To use CHAP Authentication on the iSCSI host to be added, enter the password. It is not necessary to specify this item if CHAP Authentication is not used.
  The password can be entered only when the iSCSI host has been selected, and the "Change CHAP Password" checkbox has been selected.
  Configure the user ID and the password as a pair.
  The following input conditions apply:
  - 12 - 100 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space
- Confirm CHAP Password
  The confirmation password for the member host, on which CHAP Authentication will be used, is displayed with "*".
  To use CHAP Authentication on the iSCSI host to be added, re-enter the password for confirmation. It is not necessary to specify this item if CHAP Authentication is not used.
  The password can be entered only when the iSCSI host has been selected, and the "Change CHAP Password" checkbox has been selected.
  The following input conditions apply:
  - 12 - 100 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space



→ A confirmation screen appears.

Filter setting

Filter	Description
iSCSI Name	Input the iSCSI name that is to be displayed. iSCSI hosts matching or partially matching the input iSCSI name are displayed. When not using the iSCSI name for filtering, leave this item blank.
Other Host Group	Input the other host group name that is to be displayed. iSCSI hosts which belong to any host groups that match or partially match the entered name are displayed. When not using the host group name for filtering, leave this item blank.
Host Response	Select the host response name that is to be displayed. Any iSCSI hosts that are allocated to the selected host response are displayed.

Caution

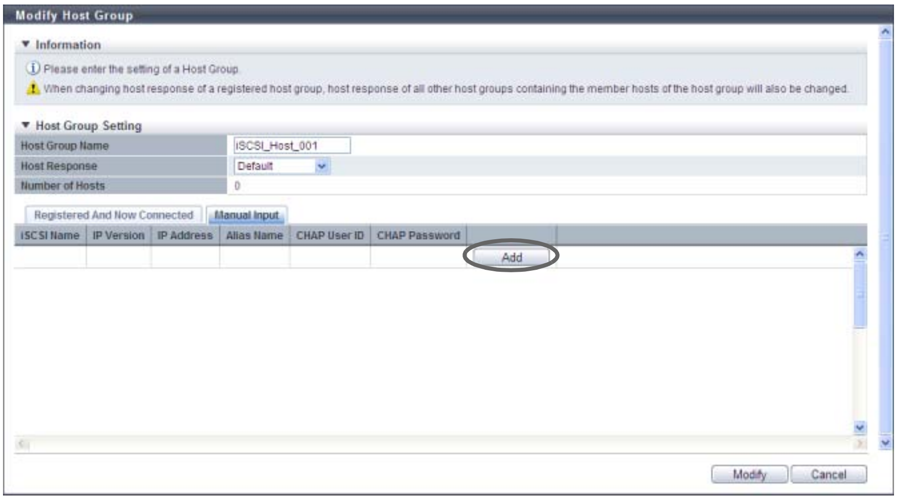
An error screen appears in the following conditions:

- When the "Host Group Name" is not entered
- When the "Host Group Name" does not satisfy the input conditions
- When the "Host Group Name" overlaps with an existing host group name (Host group names cannot overlap with any other host group names, irrespective of the interface types.)
- When the "IP Address" does not satisfy the input conditions
- When the "IP Address" is specified and an iSCSI host with the same "iSCSI Name" and "IP Address" is already registered
- When the "IP Address" is not specified and an iSCSI host with the same "iSCSI Name" and "IP Version" is already registered
- When the "Alias Name" does not satisfy the input conditions
- When the "Alias Name" overlaps the existing Alias name
- When the "CHAP User ID" does not satisfy the input conditions
- When the "CHAP Password" does not satisfy the input conditions
- When the "Confirm CHAP Password" does not satisfy the input conditions
- When the "CHAP Password" and the "Confirm CHAP Password" do not match
- When either of the "CHAP User ID" or the "CHAP Password" has been specified
- When a host cannot recognize some LUNs
- When no hosts are registered in a host group, or when nine or more hosts are registered in a host group (for ETERNUS DX8700 S2, 65 or more hosts are registered in a host group)
- When the total number of hosts has exceeded the maximum number for the ETERNUS DX Disk storage system

■ When adding a host by manually specifying the host

(1) Click the [Manual Input] tab.

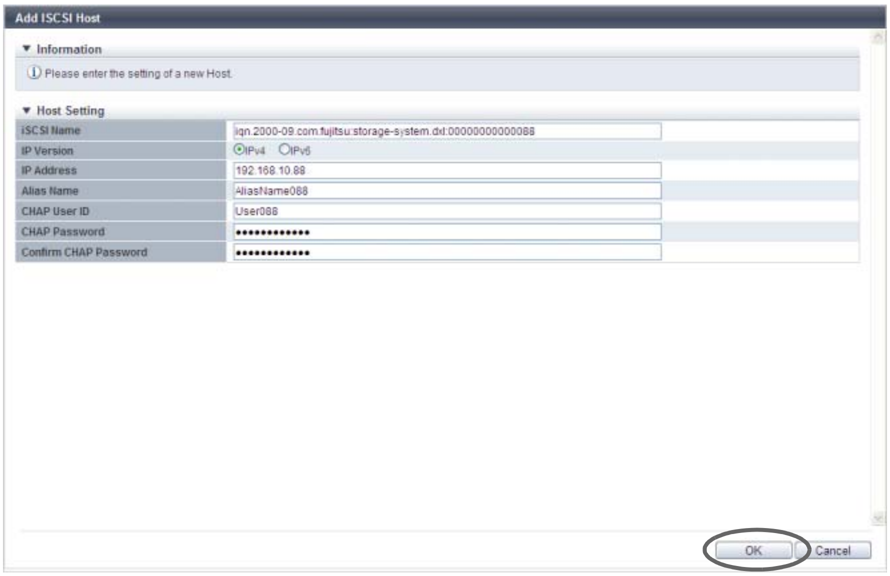
(2) Click the [Add] button.



→ The [Add iSCSI Host] screen appears.

(3) Manually specify the iSCSI host information of the host to be added, and click the [OK] button.

- iSCSI Name
  Specify an iSCSI name of the iSCSI host (required).
  The following input conditions apply:
  - Alphabetic characters (lower case) and numeric characters
  - Symbols "-" (hyphen), "." (period), and ":" (colon)
  - The name starts with "iqn." or "eui."
  - 4 - 223 characters



→ Returns to the [Manual Input] screen.

Note

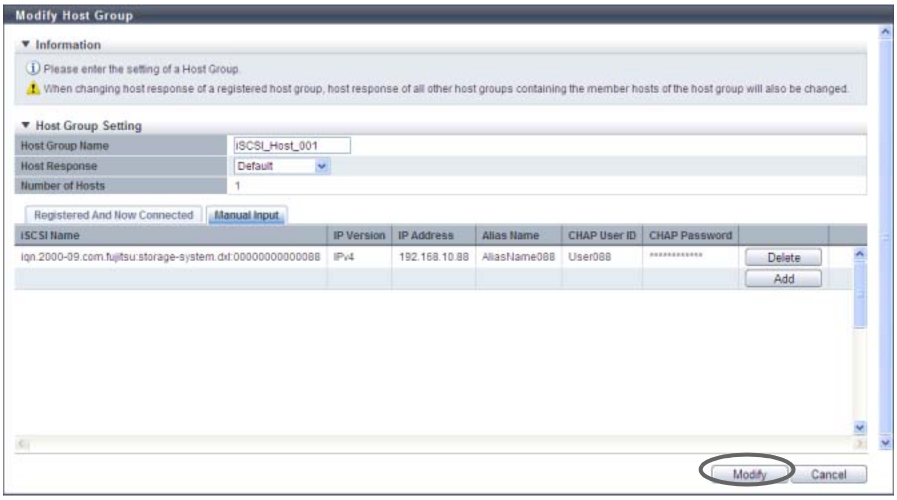
Refer to Step (2) (page 474) for other settings.

Caution

An error screen appears in the following conditions:
- When the "iSCSI Name" is not entered
- When the "iSCSI Name" does not satisfy the input conditions
- When the "IP Address" does not satisfy the input conditions
- When the "Alias Name" does not satisfy the input conditions
- When the "CHAP User ID" does not satisfy the input conditions
- When the "CHAP Password" does not satisfy the input conditions
- When the "Confirm CHAP Password" does not satisfy the input conditions
- When the "CHAP Password" and the "Confirm CHAP Password" do not match
- When either of the "CHAP User ID" or the "CHAP Password" has been specified

(4) Repeat Step (2) and Step (3) to set more iSCSI hosts.

(5) After adding or deleting iSCSI hosts is complete, click the [Modify] button.



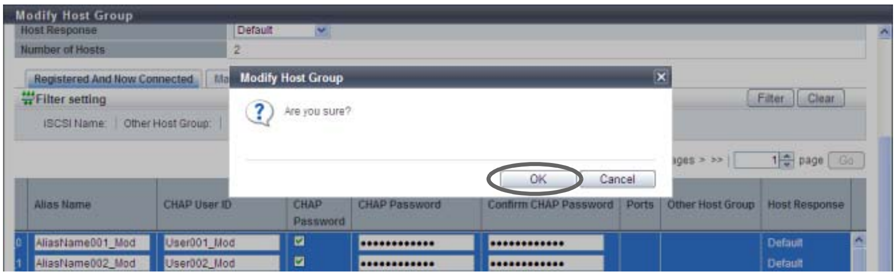
→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When the "Host Group Name" is not entered
- When the "Host Group Name" does not satisfy the input conditions
- When the "Host Group Name" overlaps with an existing host group name
  (Host group names cannot overlap with any other host group names, irrespective of the interface types.)
- When the same iSCSI name is specified for multiple iSCSI hosts
- When the "IP Address" is specified and an iSCSI host with the same "iSCSI Name" and "IP Address" is already registered
- When the "IP Address" is not specified and an iSCSI host with the same "iSCSI Name" and "IP Version" is already registered
- When the "Alias Name" overlaps the existing Alias name
- When a host cannot recognize some LUNs
- When no hosts are registered in a host group, or when nine or more hosts are registered in a host group (for ETERNUS DX8700 S2, 65 or more hosts are registered in a host group)
- When the total number of hosts has exceeded the maximum number for the ETERNUS DX Disk storage system

4 Click the [OK] button.



→ Modification of the iSCSI host group starts.

5 Click the [Done] button to return to the [Host Group] screen.

End of procedure

9.2.2.8 Modify Host Group (SAS)

This function performs the following modifications to the existing SAS host group.

- Changing the "Host Group Name" settings
- Changing the "Host Response" settings
- Changing the "Host" settings (including addition and deletion of member hosts in a host group)

Hosts can be added to host groups which the host affinity setting has been already configured, or deleted from host groups.
If a host is added, the host affinity setting is automatically configured to the host, as a host group member.
If a host is deleted, the host affinity setting is cleared from the corresponding host.

The number of hosts that can be registered

Model	Number of hosts (HBAs) (*1) per storage system	Number of hosts (HBAs) per CA port	Number of hosts (HBAs) per host group
ETERNUS DX80 S2	1024	256	8
ETERNUS DX90 S2			

*1: The total number of hosts irrespective of the interface types.

Caution

- Registration of the host is necessary to create a host group. It is not possible to delete all hosts from a host group.
- A host that has been registered with GUI by using this function belongs to one of the host groups.
- A host can be a member of several host groups. However, only one LUN group can be allocated to host and port combinations when configuring host affinity.
- To assign an appropriate host response to a created host group, refer to "User's Guide -Server Connection-" for each OS type. The host response configures the operation mode that is appropriate for the host. If an appropriate host response is not configured to the host group, the path may not be switched correctly or the volume may not be recognized correctly.
- The host response that is specified for a host group is applied all the member hosts in the target group. When a host belongs to multiple host groups, the same host response must be applied for all the groups to which the target host belongs. When a host that already belongs to an existing host group is added to another host group, the host response of the target host is changed to the host response of the host group to which the target host is added. The host response of the existing host group to which the target host belongs is also changed. Refer to "Example of changing the host response when adding a host to an existing host group" (page 447) for details.
- When changing the host response for the host group, the host responses of the other host groups to which the target host belongs are also changed.

Note

- When a host was added to a host group, of which the host affinity setting has been configured, paths between all the ports with the host affinity setting and the added host will be configured. To modify the path between a host and a port, refer to "9.2.1.3 Modify Host Affinity" (page 428).
- When a host in the host group for which the host affinity settings are already configured is deleted, the path from the host to the port is also deleted.
- To change the host group name or the SAS address, use the procedure in "9.2.2.17 Modify SAS Host" (page 514).
- To create a new host group and register hosts, use the procedure in "9.2.2.3 Add SAS Host Group" (page 456).

The procedure to edit a SAS host group is as follows:

Procedure

1 Select the SAS host group to be changed, and click [Modify Host Group] in [Action].

2 Input a new host group name, or re-select a host response to be assigned to the host group.

Host Group Setting

- Host Group Name
  Specify the host group name.
  An existing host group name cannot be specified. Refer to "Naming conventions for adding hosts" (page 994) for details.
  The following input conditions apply:
  - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space
- Host Response
  Select a host response to be assigned to a host group.
  The host response list created in the ETERNUS DX Disk storage system is displayed.
  - Solaris MPxIO
  - HP-UX
  - AIX EMPD (*1)
  - AIX VxVM
  - AIX Single Path
  - VS850/SVC
  - Host responses created in the ETERNUS DX Disk storage system
  - Default

  *1: EMPD: ETERNUS Multipath Driver

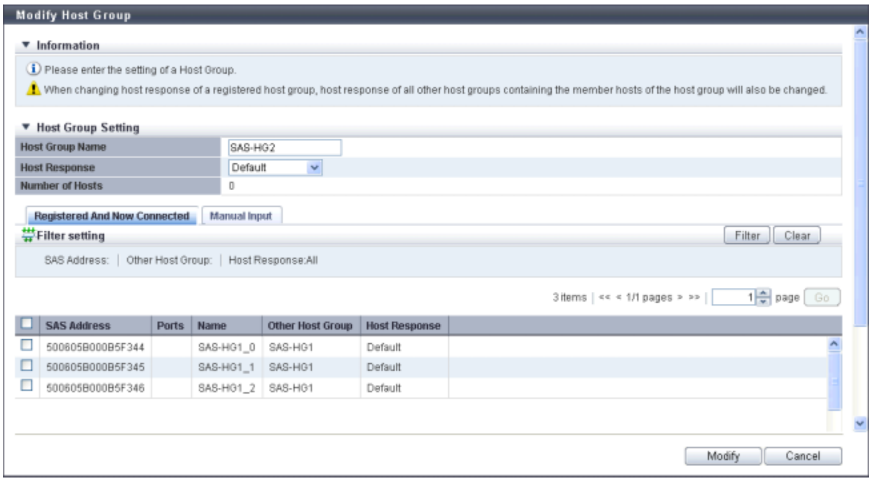
Caution

- If the host response is changed for a host group that is configured with the host affinity setting, the LUNs may not be able to be accessed from the host. Make sure to check the current LUN settings and select a host response with an appropriate "Host Specific Mode" to change the host response.

LUN settings for LUN groups with host affinity settings	Host Specific Mode				
	Normal	AIX Mode	NR1000V Mode	HP-UX Mode	BS2000 Mode
LUN#0 – LUN#255	Available	Available	Available	Available	Available
LUN#0 - LUN#511	N/A	Available	Available	Available	Available
LUN#0 - LUN#1023	N/A	N/A	N/A	Available	Available
LUN#0 - LUN#4095	N/A	N/A	N/A	N/A	Available

Available: The host can recognize LUNs
N/A: The host cannot recognize some LUNs

- The following modifications are applied for the host response settings with firmware version V10L15 or later.
  - "Others" is changed to "Default".
  - "Windows EMPD", "Linux EMPD", and "Solaris EMPD" are deleted from the "Host Response" value. However, these parameters are displayed if they are applied for host groups.
  - The setting parameters for "Windows EMPD", "Linux EMPD", and "Solaris EMPD" are the same as "Default". If one of the host responses that is described here is applied to a host group, change the setting to "Default".



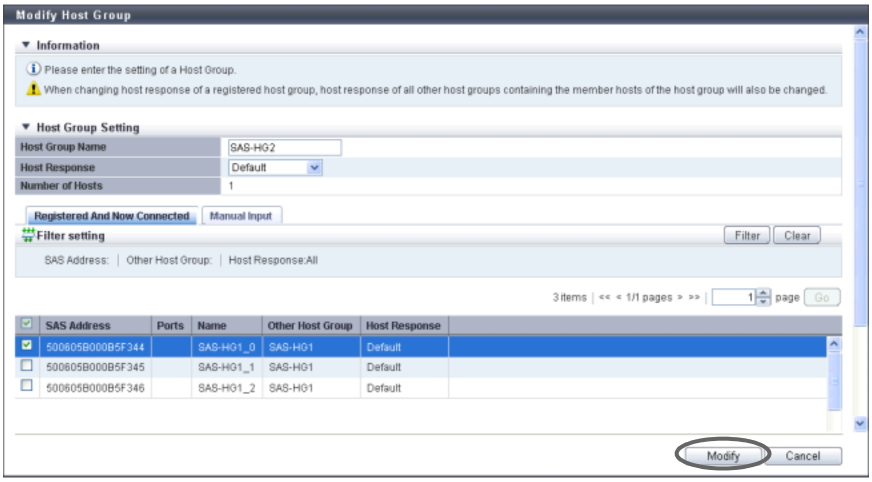
3 Add or delete a host in a host group in the following procedures.

■ When adding or deleting a host by selecting from the host list

(1) Click the [Registered And Now Connected] tab.

(2) Add or delete hosts, and click the [Modify] button.

- Checkbox to select a host
  Select the corresponding host checkbox in the SAS host list, to add a host.
  Clear the corresponding host checkbox in the SAS host list, to delete a host.



→ A confirmation screen appears.

Filter setting

Filter	Description
SAS Address	Input the SAS address to be displayed. SAS hosts matching or partially matching the input SAS address are displayed. When not using the SAS address for filtering, leave this item blank.
Other Host Group	Input the other host group name that is to be displayed. SAS hosts which belong to any host groups that match or partially match the entered name are displayed. When not using the host group name for filtering, leave this item blank.
Host Response	Select the host response name that is to be displayed. Any SAS hosts that are allocated to the selected host response are displayed.

Caution

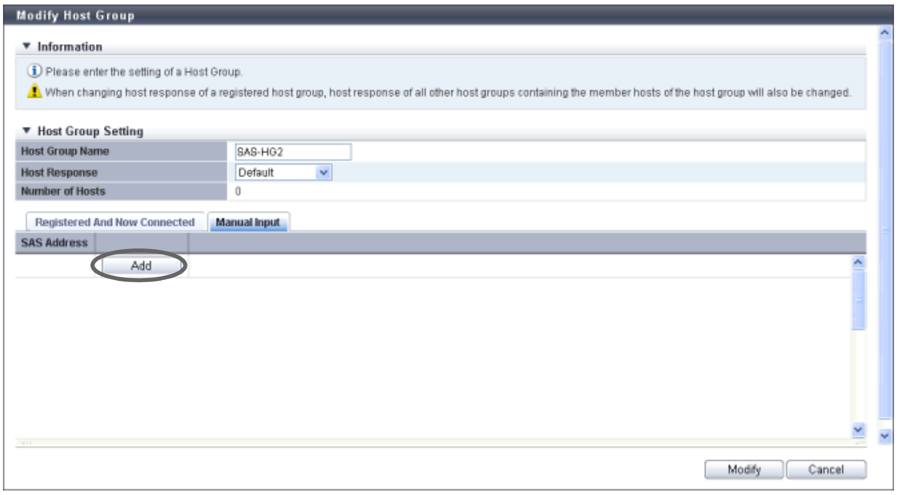
An error screen appears in the following conditions:

- When the "Host Group Name" is not entered
- When the "Host Group Name" does not satisfy the input conditions
- When the "Host Group Name" overlaps with an existing host group name
  (Host group names cannot overlap with any other host group names, irrespective of the interface types.)
- When a host cannot recognize some LUNs
- When no hosts are registered in a host group, or when nine or more hosts are registered in a host group
- When the total number of hosts has exceeded the maximum number for the ETERNUS DX Disk storage system

■ When adding a host by manually specifying the host

(1) Click the [Manual Input] tab.

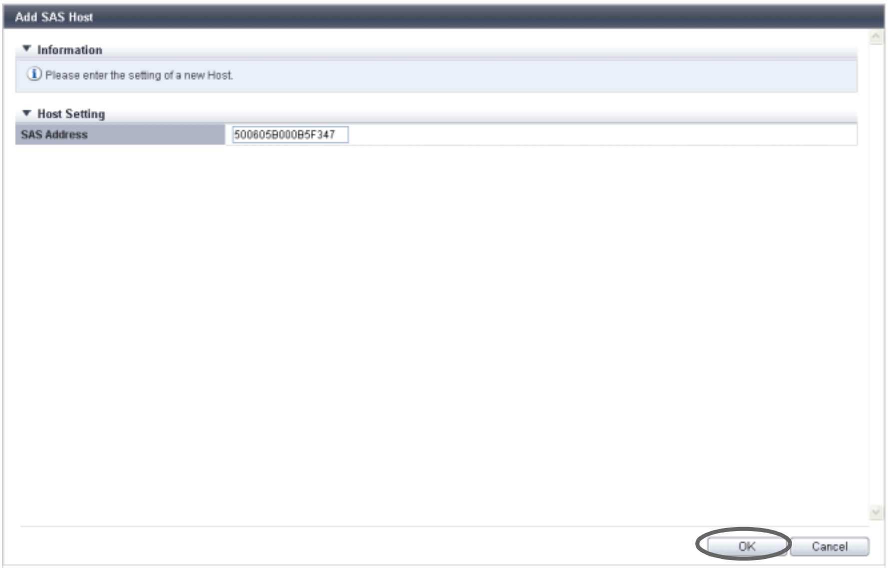
(2) Click the [Add] button.



→ The [Add SAS Host] screen appears.

(3) Manually specify the SAS address of the host to be added, and click the [OK] button.

- SAS Address
  Specify the SAS address of the SAS host.
  The following input conditions apply:
  - 16 hexadecimal numbers
  - "F (f)" or "0" used in entire 16 characters are not allowed.



→ Returns to the [Manual Input] screen.

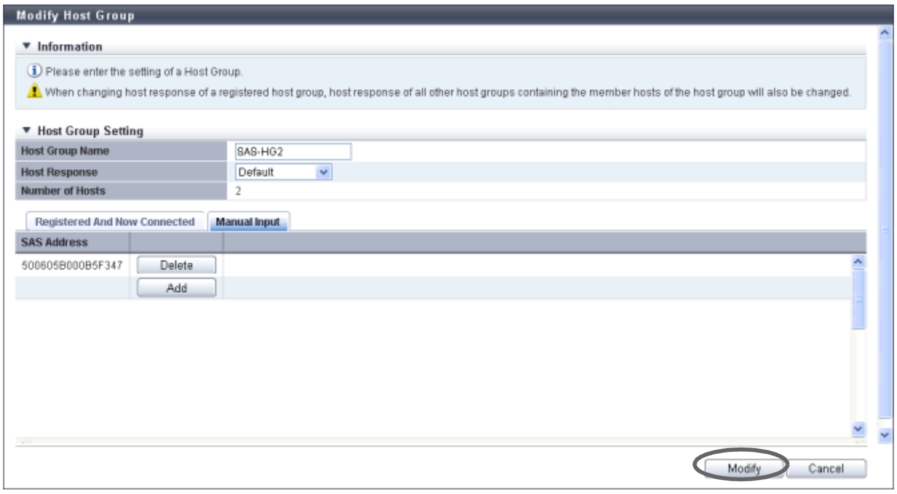
Caution

An error screen appears in the following conditions:

- When the "SAS Address" is not input
- When the "SAS Address" does not satisfy the input conditions

(4) Repeat Step (2) and Step (3) to set more SAS addresses.

(5) After adding or deleting SAS hosts is complete, click the [Modify] button.



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When the "Host Group Name" is not entered
- When the "Host Group Name" does not satisfy the input conditions
- When the "Host Group Name" overlaps with an existing host group name
  (Host group names cannot overlap with any other host group names, irrespective of the interface types.)
- When the several SAS hosts with the same SAS addresses have been registered
- When a host cannot recognize some LUNs
- When no hosts are registered in a host group, or when nine or more hosts are registered in a host group
- When the total number of hosts has exceeded the maximum number for the ETERNUS DX Disk storage system

4 Click the [OK] button.



→ Modification of the SAS host group starts.

5 Click the [Done] button to return to the [Host Group] screen.

End of procedure

9.2.2.9 Add FC/FCoE Host

This function registers a new FC/FCoE host (HBA).
The total number of all the interface type hosts that can be registered in the ETERNUS DX Disk storage system is 1024 (8192 for the ETERNUS DX8700 S2).

Caution

- This action item is only displayed when the "Use "Add Host"" checkbox is selected for the "Function to Add Host" field in "Web GUI Settings". This item is not selected (not displayed) by default. Refer to "11.2.13.4 Setup Subsystem Parameters" (page 935) for details.
- Note that this function does not create a host group. The ETERNUS DX Disk storage system also has a function that creates new host groups to register hosts as its members. Refer to "9.2.2.1 Add FC/FCoE Host Group" (page 440) for details.
- Hosts that are registered with this function can belong to multiple host groups. However, only one LUN group can be allocated to host and port combinations when configuring host affinity.
- Refer to "User's Guide -Server Connection-" for each OS type to assign an appropriate host response to the host that is to be registered. The host response configures the operation mode which is appropriate to the host.
  If an appropriate host response is not configured, the path may not be switched correctly or the volume may not be recognized correctly.

Note

- To change the FC host information, use the [Modify FC/FCoE Host] function. Refer to "9.2.2.15 Modify FC/FCoE Host" (page 507) for details.
- The host affinity setting can be specified for each FC host. Refer to "9.2.1.1 Create Host Affinity" (page 414) for details.
- Both "FC host" and "FCoE host" are abbreviated as "FC host" in this section.

The procedure to register an FC host is as follows:

Procedure

1 Click [Add FC/FCoE Host] in [Action].

2 Add a host in the ETERNUS DX Disk storage system in the following procedures.

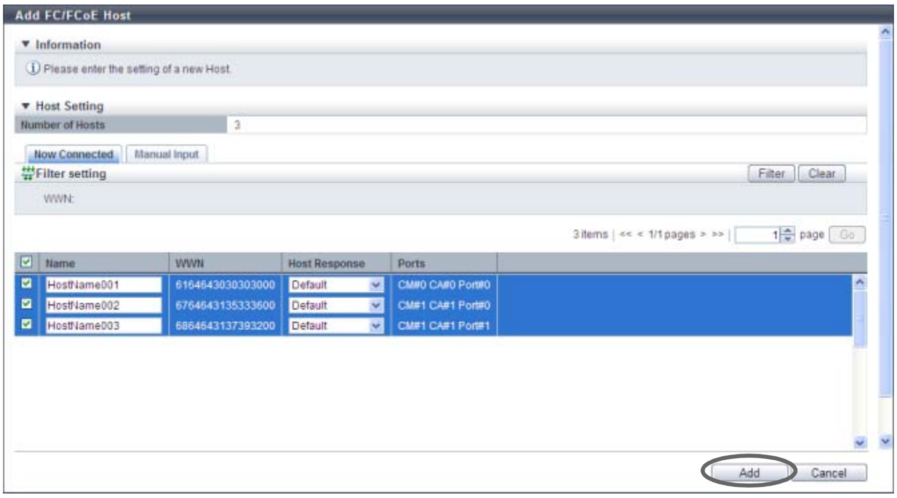
■ When registering a host by selecting from the host list

(1) Click the [Now Connected] tab.

(2) Select the host that is to be registered from the FC host list, input the FC host information, and click the [Add] button.

- Checkbox to select a host
  Select the checkbox of the FC host that is to be registered in the ETERNUS DX Disk storage system. The host name and host response can only be specified for the selected FC host.
- Name
  Input the name for the FC host.
  The following input conditions apply:
  - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space
- Host Response
  Select a host response to be assigned to a host.
  The host response list created in the ETERNUS DX Disk storage system is displayed.
  - Solaris MPxIO
  - HP-UX
  - AIX EMPD (*1)
  - AIX VxVM
  - AIX Single Path
  - VS850/SVC
  - Host responses created in the ETERNUS DX Disk storage system
  - Default

  *1: EMPD: ETERNUS Multipath Driver



→ A confirmation screen appears.

Filter Setting

Filter	Description
WWN	Input the WWN that is to be displayed. FC hosts matching or partially matching the entered WWN are displayed. When not using the WWN for filtering, leave this item blank.

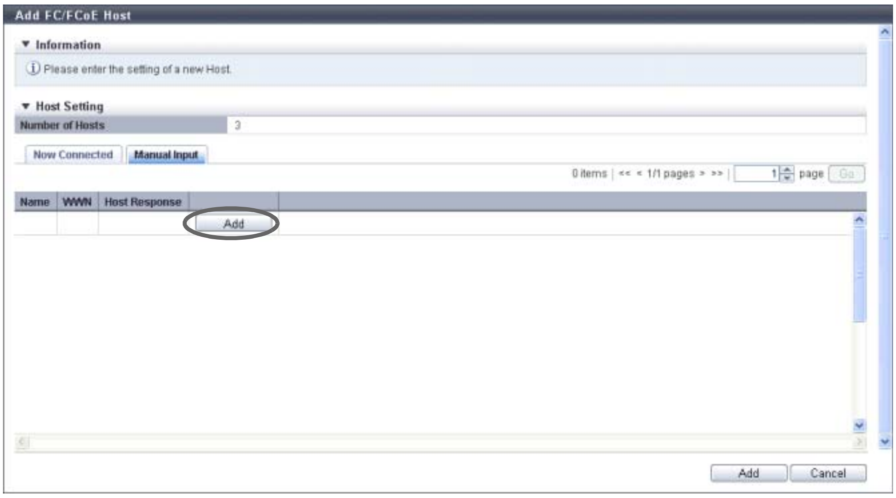
Caution

- If the WWN is not displayed when clicking the [Rediscover] button, make sure that there is no error in the connection environment, such as the connection between the host and the switch, and the CA port settings of the ETERNUS DX Disk storage system. If there is no error in the connection environment, contact the Support Department, or specify the WWN manually.
- An error screen appears in the following conditions:
  - When the "Name" is not entered
  - When the "Name" does not satisfy the input conditions
  - When the "Name" is already used for the registration target host or the same "Name" is already used in the ETERNUS DX Disk storage system
  - When the number of hosts that is to be registered is "0"
  - When the number of registered hosts has exceeded the maximum number for the ETERNUS DX Disk storage system

■ When registering a host by manually specifying the host

(1) Click the [Manual Input] tab.

(2) Click the [Add] button.



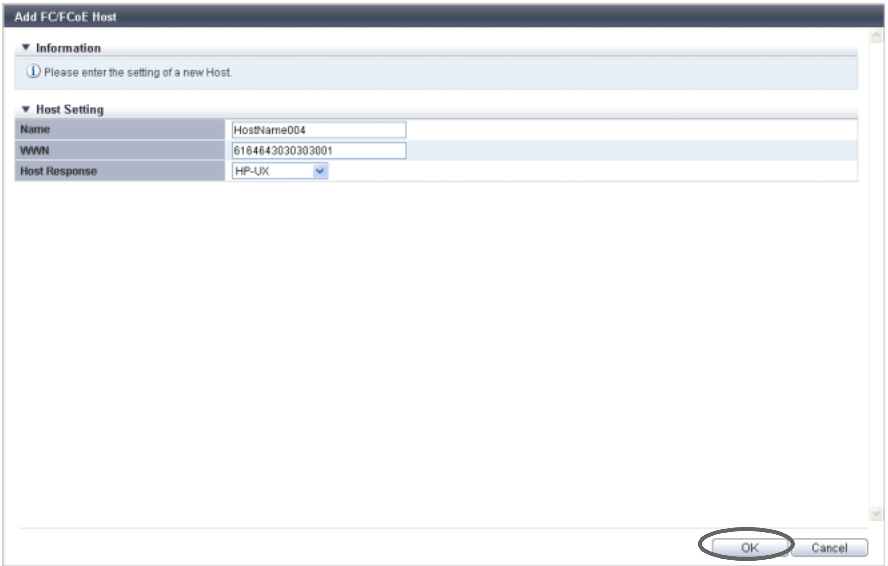
→ The [Add FC/FCoE Host] screen appears.

(3) Specify the host information of the FC host that is to be registered, and click the [OK] button.

- Name
  Specify the FC host name.
  The following input conditions apply:
  - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Spaces
- WWN
  Input the WWN for the FC host.
  The following input conditions apply:
  - Hexadecimal numbers (0 - 9, A - F, a - f)
  - 16 characters
  - "F (f)" or "0" used in entire 16 characters are not allowed.

- Host Response
  Select a host response to be assigned to an FC host.
  The host response list created in the ETERNUS DX Disk storage system is displayed.
  - Solaris MPxIO
  - HP-UX
  - AIX EMPD (*1)
  - AIX VxVM
  - AIX Single Path
  - VS850/SVC
  - Host responses created in the ETERNUS DX Disk storage system
  - Default

  *1: EMPD: ETERNUS Multipath Driver



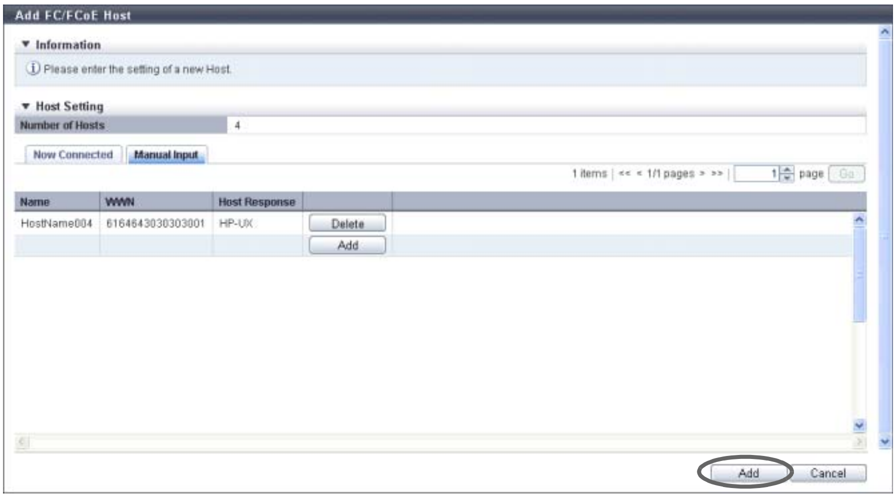
→ Returns to the [Manual Input] screen.

Caution

An error screen appears in the following conditions:
- When the "Name" is not entered
- When the "Name" does not satisfy the input conditions
- When the "Name" is already used for the registration target host
- When the "WWN" is not entered
- When the "WWN" does not satisfy the input conditions
- When the "WWN" is already used for the registration target host

(4) Repeat Step (2) and Step (3) when registering several FC hosts.

(5) After registering the FC host is complete, click the [Add] button.



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When the same "Name" is already used in the ETERNUS DX Disk storage system
- When the same "WWN" is already used in the ETERNUS DX Disk storage system
- When the number of hosts that is to be registered is "0"
- When the number of registered hosts has exceeded the maximum number for the ETERNUS DX Disk storage system

3 Click the [OK] button.



→ Registration of the FC host starts.

4 Click the [Done] button to return to the screen when starting this function in Step 1.

Note

Click the [Continue] button to continue registering FC hosts.

End of procedure

9.2.2.10 Add iSCSI Host

This function registers a new iSCSI host (HBA).
The total number of all the interface type hosts that can be registered in the ETERNUS DX Disk storage system is 1024 (8192 for the ETERNUS DX8700 S2).

Caution

- This action item is only displayed when the "Use "Add Host"" checkbox is selected for the "Function to Add Host" field in "Web GUI Settings". This item is not selected (not displayed) by default. Refer to "11.2.13.4 Setup Subsystem Parameters" (page 935) for details.
- Note that this function does not create a host group. The ETERNUS DX Disk storage system also has a function that creates new host groups to register hosts as its members. Refer to "9.2.2.2 Add iSCSI Host Group" (page 448) for details.
- Hosts that are registered with this function can belong to multiple host groups. However, only one LUN group can be allocated to host and port combinations when configuring host affinity.
- Refer to "User's Guide -Server Connection-" for each OS type to assign an appropriate host response to the host that is to be registered. The host response configures the operation mode which is appropriate to the host.
  If an appropriate host response is not configured, the path may not be switched correctly or the volume may not be recognized correctly.
- Unlike GUI, CLI can register two iSCSI hosts that have the same iSCSI name by setting an IP address for one of these iSCSI hosts and by not setting an IP address for the other iSCSI host. However, if iSCSI hosts are registered in the ETERNUS DX Disk storage system in this way, iSCSI hosts cannot be added using GUI. Avoid this configuration when using GUI and CLI together. If both iSCSI hosts already exist, use CLI to specify an IP address for the iSCSI host without the IP address.

Note

- To change the iSCSI host information, use the [Modify iSCSI Host] function. Refer to "9.2.2.16 Modify iSCSI Host" (page 509) for details.
- The host affinity setting can be specified for each iSCSI host. Refer to "9.2.1.1 Create Host Affinity" (page 414) for details.

The procedure to register an iSCSI host is as follows:

Procedure

1 Click [Add iSCSI Host] in [Action].

2 Add a host in the ETERNUS DX Disk storage system in the following procedures.

■ When registering a host by selecting from the host list

(1) Click the [Now Connected] tab.
All of the unregistered hosts that are connected to the iSCSI-CAs or the iSCSI-CA/RAs and that can be recognized by the ETERNUS DX Disk storage system (*1) are displayed. Select the hosts that are to be registered in the ETERNUS DX Disk storage system and specify the iSCSI host information.

*1: "Host that is not registered in the ETERNUS DX Disk storage system" indicates that a host with the same iSCSI name, IP version, and Alias Name as the target host is not registered in the storage system. The host is regarded as unregistered host even if a host with the same iSCSI name, IP version, Alias Name, and different IP address is already registered. The obtained "iSCSI Name" and "Port" are displayed.

(2) Select the host that is to be registered from the iSCSI host list, input the iSCSI host information, and click the [Add] button.

- Checkbox to select a host
  Select the checkbox of the iSCSI host that is to be registered in the ETERNUS DX Disk storage system.

Caution

- If the iSNS server has not been configured in "9.2.3.8 Modify iSCSI Port Parameters" (page 541), the iSCSI host cannot be automatically acquired.
- The following restrictions in the environment that is described below apply for the automatic acquirement of host information (*1) even when the iSNS server is specified.

  *1: "iSCSI Name", "IP Version", "IP Address", and "Alias Name"

  - When one of the following OSs is used and there are multiple hosts that have the same iSCSI name but different IP addresses, only the information of one host can be acquired.
    - Windows Server 2003
    - Windows Server 2008
    - Windows Server 2008 R2
    - Oracle Solaris 10
  - When the host OS is Oracle Solaris 11, "IP Version" and "IP Address" cannot be acquired.
- The following items can be specified only for the iSCSI hosts that are selected by checkboxes; "Name", "Host Response", "IP Version", "IP Address", "Alias Name", "CHAP User ID", "CHAP Password", and "Confirm CHAP Password".

- Name
  Input the name for the iSCSI host.
  The following input conditions apply:
  - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space

- Host Response
  Select a host response to be assigned to an iSCSI host.
  The host response list created in the ETERNUS DX Disk storage system is displayed.
  - Solaris MPxIO
  - HP-UX
  - AIX EMPD (*1)
  - AIX VxVM
  - AIX Single Path
  - VS850/SVC
  - Host responses created in the ETERNUS DX Disk storage system
  - Default

  *1: EMPD: ETERNUS Multipath Driver
- IP Version
  Select the IP version of the iSCSI host from "IPv4" and "IPv6".

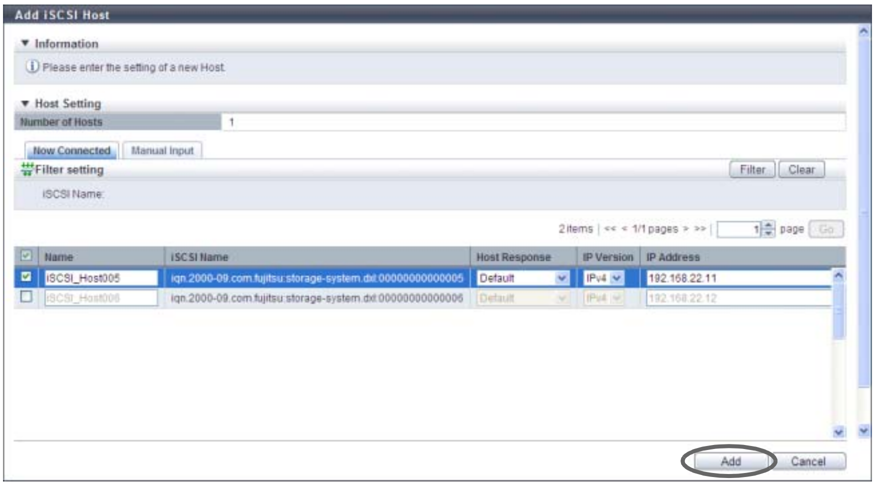
Caution

To register an iSCSI host without using an IP address, perform IP version selection as follows:

- Select "IPv4" when the IP address format of the iSCSI host is IPv4 (when using an IPv4 host)
- Select "IPv6" when the IP address format of the iSCSI host is IPv6 (when using an IPv6 host)
- If the IP address format of the iSCSI host cannot be checked (when either an IPv4 host or an IPv6 host is used), register two hosts. Select "IPv4" for one host, and select "IPv6" for the other host. Specify the same iSCSI name, CHAP user ID, and CHAP password for each host.

- IP Address
  Specify the IP address of the iSCSI host.
  There are two methods to specify an IP address; "IPv4" and "IPv6". The IP address must be specified with the selected IP version (IPv4 or IPv6). The following IPv6 addresses can be used; "link local address", "global address", "unique local address", and "6to4 address". Refer to "Available IPv6 Address" (page 757) for details. When the current setting is displayed, the IPv6 address is displayed as an abbreviation.
  It is not necessary to specify this item if IP address is not used.
  The following input conditions apply:
  - For IPv4 address
    xxx.xxx.xxx.xxx
    xxx: 1 - 255 for the top field (decimal)
    xxx: 0 - 255 for other fields (decimal)
  - For IPv6 address
    xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
    Refer to "IPv6 Address Notation" (page 378) for details.
- Alias Name
  Specify the Alias name of the iSCSI host.
  It is not necessary to specify this item if Alias name is not used.
  An existing Alias name cannot be specified.
  The following input conditions apply:
  - Up to 31 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space

- CHAP User ID
  Specify the user ID for the CHAP Authentication.
  It is not necessary to specify this item if the CHAP Authentication is not used.
  Configure a user ID and a password as a pair.
  The following input conditions apply:
  - Up to 255 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space
- CHAP Password
  Specify the password for the CHAP Authentication.
  It is not necessary to specify this item if the CHAP Authentication is not used.
  Configure a user ID and a password as a pair.
  The following input conditions apply:
  - 12 - 100 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space
- Confirm CHAP Password
  Input the CHAP password again for confirmation.
  The following input conditions apply:
  - 12 - 100 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space



→ A confirmation screen appears.

Filter Setting

Filter	Description
iSCSI Name	Input the iSCSI name that is to be displayed. iSCSI hosts matching or partially matching the entered iSCSI name are displayed. When not using the iSCSI name for filtering, leave this item blank.

Caution

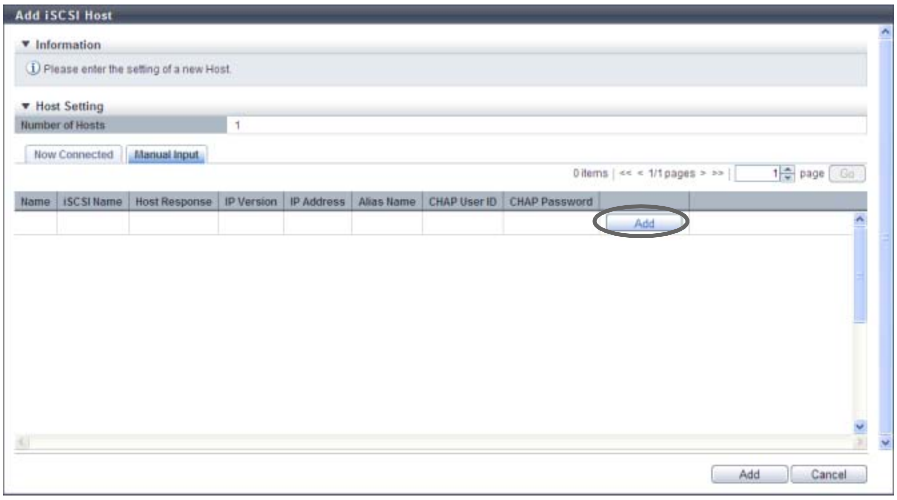
An error screen appears in the following conditions:

- When the "Name" is not entered
- When the "Name" does not satisfy the input conditions
- When the "Name" is already used for the registration target host or the same "Name" is already used in the ETERNUS DX Disk storage system
- When the "IP Address" does not satisfy the input conditions
- When the "IP Address" is specified and an iSCSI host with the same "iSCSI Name" and "IP Address" is already registered
- When the "IP Address" is not specified and an iSCSI host with the same "iSCSI Name" and "IP Version" is already registered
- When the "Alias Name" does not satisfy the input conditions
- When the "Alias Name" is already used for the registration target host or the same "Alias Name" is already used in the ETERNUS DX Disk storage system
- When the "CHAP User ID" does not satisfy the input conditions
- When the "CHAP Password" does not satisfy the input conditions
- When the "CHAP Password" and the "Confirm CHAP Password" do not match
- When either of the "CHAP User ID" or the "CHAP Password" has been specified
- When the number of hosts that is to be registered is "0"
- When the number of registered hosts has exceeded the maximum number for the ETERNUS DX Disk storage system

■ When registering a host by manually specifying the host

(1) Click the [Manual Input] tab.

(2) Click the [Add] button.



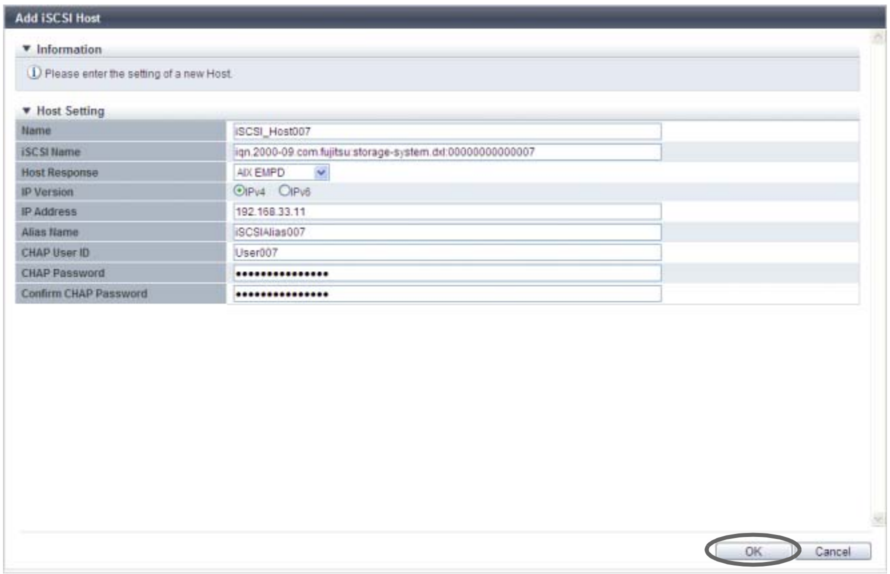
→ The [Add iSCSI Host] screen appears.

(3) Specify the host information of the iSCSI host that is to be registered, and click the [OK] button.

- iSCSI Name
  Specify an iSCSI name of the iSCSI host (required).
  The following input conditions apply:
  - Alphabetic characters (lower case) and numeric characters
  - Symbols "-" (hyphen), "." (period), and ":" (colon)
  - The name starts with "iqn." or "eui."
  - 4 - 223 characters

Note

Refer to Step (2) (page 493) for other settings.



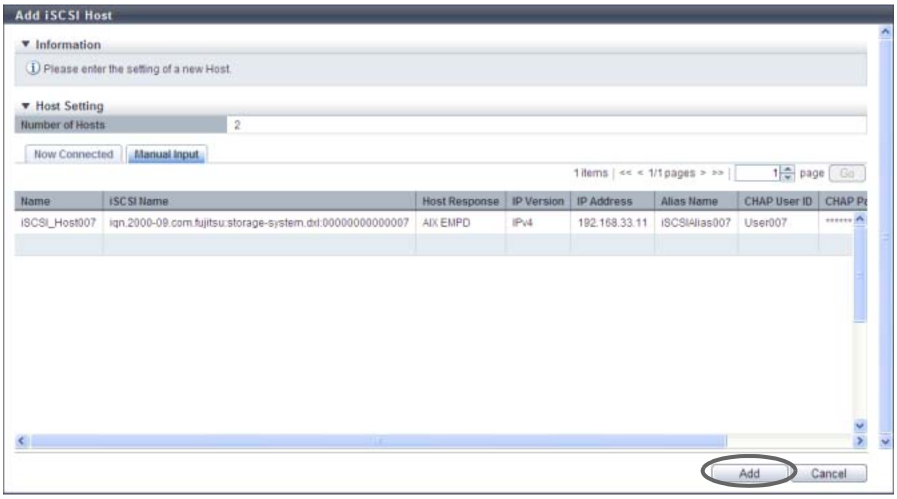
→ Returns to the [Manual Input] screen.

Caution

An error screen appears in the following conditions:
- When the "Name" is not entered
- When the "Name" does not satisfy the input conditions
- When the "Name" is already used for the registration target host
- When the "iSCSI Name" is not entered
- When the "iSCSI Name" does not satisfy the input conditions
- When the "iSCSI Name" is already used for the registration target host
- When the "IP Address" does not satisfy the input conditions
- When the "Alias Name" does not satisfy the input conditions
- When the "Alias Name" is already used for the registration target host
- When the "CHAP User ID" does not satisfy the input conditions
- When the "CHAP Password" does not satisfy the input conditions
- When the "CHAP Password" and the "Confirm CHAP Password" do not match
- When either of the "CHAP User ID" or the "CHAP Password" has been specified

(4) Repeat Step (2) and Step (3) when registering several iSCSI hosts.

(5) After registering the iSCSI host is complete, click the [Add] button.



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When the same "Name" is already used in the ETERNUS DX Disk storage system
- When the same "iSCSI Name" is already used in the ETERNUS DX Disk storage system
- When the "IP Address" is specified and an iSCSI host with the same "iSCSI Name" and "IP Address" is already registered
- When the "IP Address" is not specified and an iSCSI host with the same "iSCSI Name" and "IP Version" is already registered
- When the same "Alias Name" is already used in the ETERNUS DX Disk storage system
- When the number of hosts that is to be registered is "0"
- When the number of registered hosts has exceeded the maximum number for the ETERNUS DX Disk storage system

3 Click the [OK] button.



→ Registration of the iSCSI host starts.

4 Click the [Done] button to return to the screen when starting this function in Step 1.

Note

Click the [Continue] button to continue registering iSCSI hosts.

End of procedure

9.2.2.11 Add SAS Host

This function registers a new SAS host (HBA).
The total number of all the interface type hosts that can be registered in the ETERNUS DX Disk storage system is 1024.

Caution

- This action item is only displayed when the "Use "Add Host"" checkbox is selected for the "Function to Add Host" field in "Web GUI Settings". This item is not selected (not displayed) by default. Refer to "11.2.13.4 Setup Subsystem Parameters" (page 935) for details.
- Note that this function does not create a host group. The ETERNUS DX Disk storage system also has a function that creates new host groups to register hosts as its members. Refer to "9.2.2.3 Add SAS Host Group" (page 456) for details.
- Hosts that are registered with this function can belong to multiple host groups. However, only one LUN group can be allocated to host and port combinations when configuring host affinity.
- Refer to "User's Guide -Server Connection-" for each OS type to assign an appropriate host response to the host that is to be registered. The host response configures the operation mode which is appropriate to the host.
  If an appropriate host response is not configured, the path may not be switched correctly or the volume may not be recognized correctly.

Note

- To change the SAS host information, use the [Modify SAS Host] function. Refer to "9.2.2.17 Modify SAS Host" (page 514) for details.
- The host affinity setting can be specified for each SAS host. Refer to "9.2.1.1 Create Host Affinity" (page 414) for details.

The procedure to register a SAS host is as follows:

Procedure

1 Click [Add SAS Host] in [Action].

2 Add a host in the ETERNUS DX Disk storage system in the following procedures.

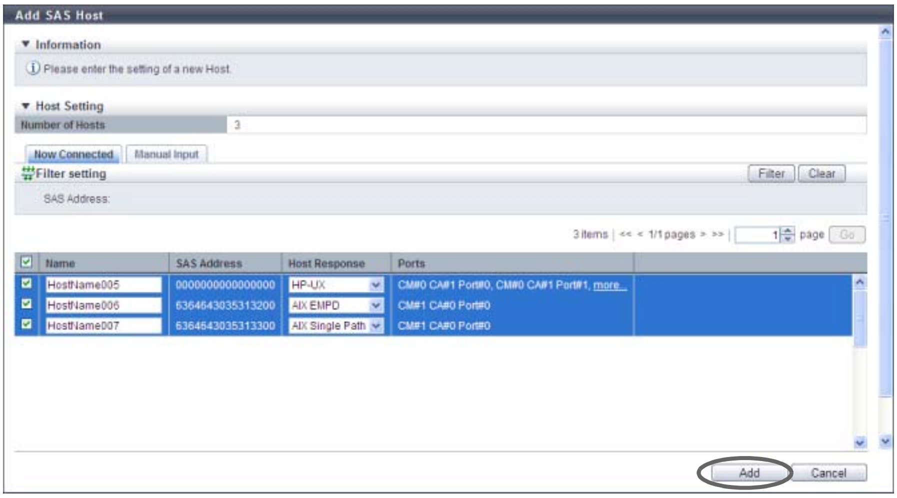
■ When registering a host by selecting from the host list

(1) Click the [Now Connected] tab.

(2) Select the host that is to be registered from the SAS host list, input the SAS host information, and click the [Add] button.

- Checkbox to select a host
  Select the checkbox of the SAS host that is to be registered in the ETERNUS DX Disk storage system. The host name and host response can only be specified for the selected SAS host.
- Name
  Input the name for the SAS host.
  The following input conditions apply:
  - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space
- Host Response
  Select a host response to be assigned to a host.
  The host response list created in the ETERNUS DX Disk storage system is displayed.
  - Solaris MPxIO
  - HP-UX
  - AIX EMPD (*1)
  - AIX VxVM
  - AIX Single Path
  - VS850/SVC
  - Host responses created in the ETERNUS DX Disk storage system
  - Default

  *1: EMPD: ETERNUS Multipath Driver



→ A confirmation screen appears.

Filter Setting

Filter	Description
SAS Address	Input the SAS address that is to be displayed. SAS hosts matching or partially matching the entered SAS address are displayed. When not using the SAS address for filtering, leave this item blank.

Caution

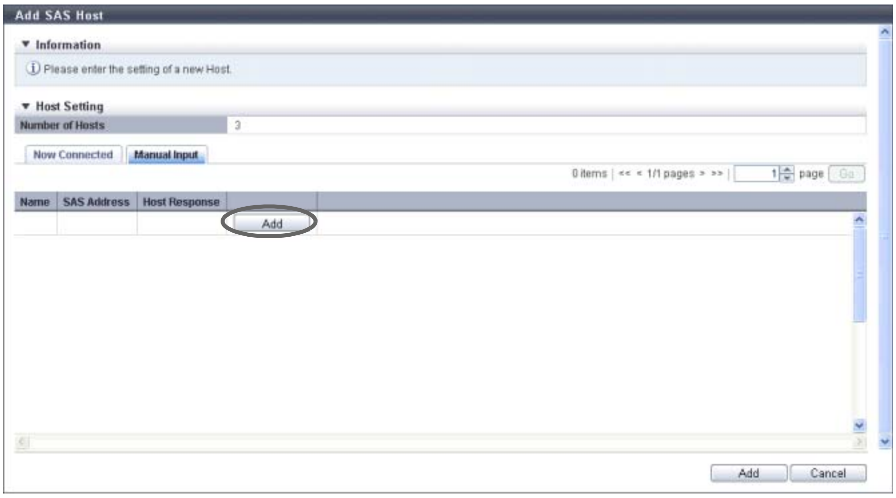
An error screen appears in the following conditions:

- When the "Name" is not entered
- When the "Name" does not satisfy the input conditions
- When the "Name" is already used for the registration target host or the same "Name" is already used in the ETERNUS DX Disk storage system
- When the number of hosts that is to be registered is "0"
- When the number of registered hosts has exceeded the maximum number for the ETERNUS DX Disk storage system

■ When registering a host by manually specifying the host

(1) Click the [Manual Input] tab.

(2) Click the [Add] button.



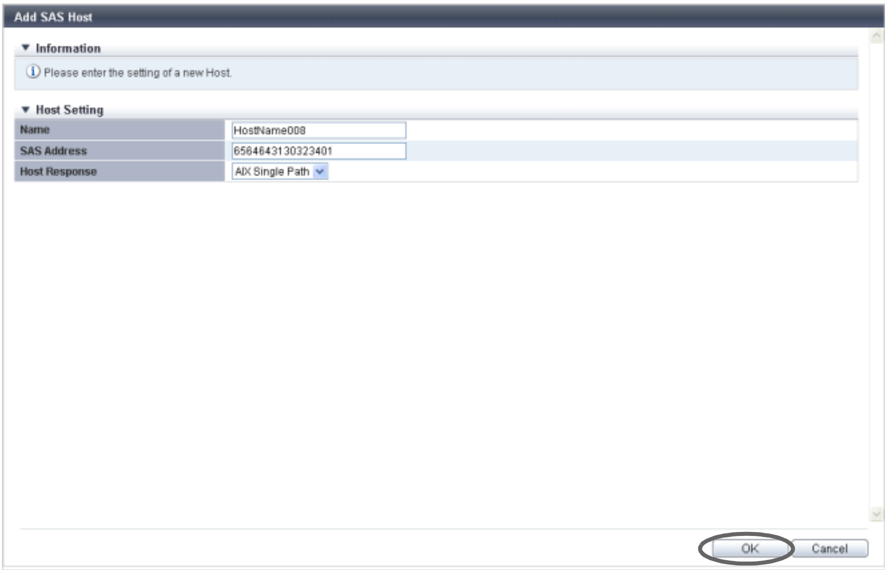
→ The [Add SAS Host] screen appears.

(3) Specify the host information of the SAS host that is to be registered, and click the [OK] button.

- Name
  Specify the SAS host name.
  The following input conditions apply:
  - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Spaces
- SAS Address
  Specify the SAS address of the SAS host.
  The following input conditions apply:
  - 16 hexadecimal numbers
  - "F (f)" or "0" used in entire 16 characters are not allowed.

- Host Response
  Select a host response to be assigned to a SAS host.
  The host response list created in the ETERNUS DX Disk storage system is displayed.
  - Solaris MPxIO
  - HP-UX
  - AIX EMPD (*1)
  - AIX VxVM
  - AIX Single Path
  - VS850/SVC
  - Host responses created in the ETERNUS DX Disk storage system
  - Default

  *1: EMPD: ETERNUS Multipath Driver



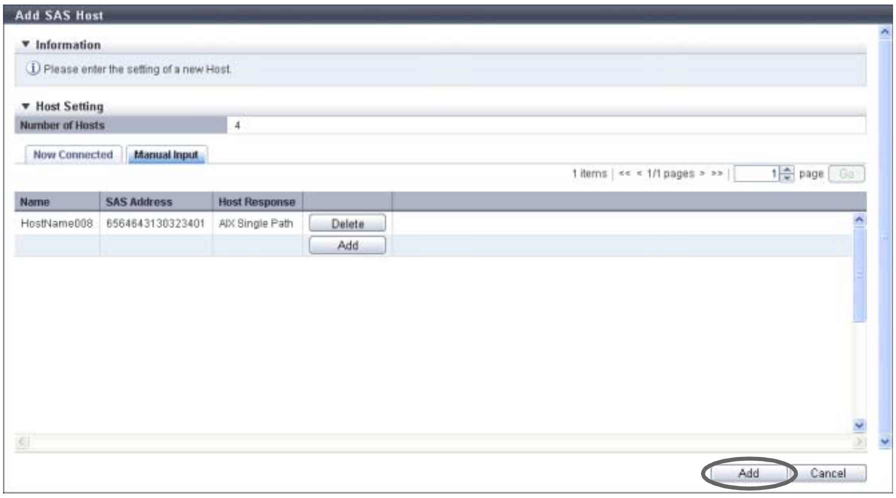
→ Returns to the [Manual Input] screen.

Caution

An error screen appears in the following conditions:
- When the "Name" is not entered
- When the "Name" does not satisfy the input conditions
- When the "Name" is already used for the registration target host
- When the "SAS Address" is not entered
- When the "SAS Address" does not satisfy the input conditions
- When the "SAS Address" is already used for the registration target host

(4) Repeat Step (2) and Step (3) when registering several SAS hosts.

(5) After registering the SAS host is complete, click the [Add] button.



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When the same "Name" is already used in the ETERNUS DX Disk storage system
- When the same "SAS Address" is already used in the ETERNUS DX Disk storage system
- When the number of hosts that is to be registered is "0"
- When the number of registered hosts has exceeded the maximum number for the ETERNUS DX Disk storage system

3 Click the [OK] button.



→ Registration of the SAS host starts.

4 Click the [Done] button to return to the screen when starting this function in Step 1.

Note

Click the [Continue] button to continue registering SAS hosts.

End of procedure

9.2.2.12 Delete FC/FCoE Host

This function deletes an FC/FCoE host.
When an FC/FCoE host belongs to a host group, the FC/FCoE host can be deleted, irrespective of its host affinity settings.

Caution

- Not all of the hosts can be deleted from a host group.
- When an FC host does not belong to a host group, the FC host, of which host affinity settings have been configured, cannot de deleted.

Note

- When a host in the host group for which the host affinity settings are already configured is deleted, the path from the host to the port is also deleted.
- The "FCoE" host interface is regarded as "FC". Both "FC host" and "FCoE host" are abbreviated as "FC host" in this section.

The procedure to delete an FC host is as follows:

Procedure

1 Select the FC host to be deleted (multiple selections can be made) and click [Delete FC/FCoE Host] in [Action].

→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When the selected FC host is the last host in a host group
- When the selected FC host does not belong to any host group and the host affinity setting has been configured for the target FC host
- When the selected FC host does not exist

2 Click the [OK] button.



→ Deletion of the FC host starts.

3 Click the [Done] button to return to the [FC/FCoE Host] screen.

End of procedure

9.2.2.13 Delete iSCSI Host

This function deletes an iSCSI host.
When an iSCSI host belongs to a host group, the iSCSI host can be deleted, irrespective of its host affinity settings.

Caution

- Not all of the hosts can be deleted from a host group.
- When an iSCSI host does not belong to a host group, the iSCSI host, of which host affinity settings have been configured, cannot de deleted.

Note

When a host in the host group for which the host affinity settings are already configured is deleted, the path from the host to the port is also deleted.

The procedure to delete an iSCSI host is as follows:

Procedure

1 Select the iSCSI host to be deleted (multiple selections can be made) and click [Delete iSCSI Host] in [Action].

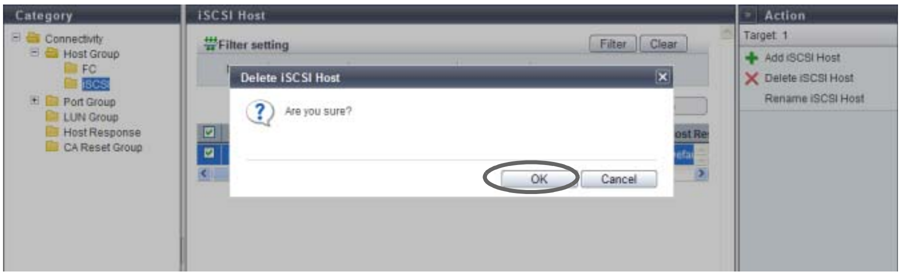
→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When the selected iSCSI host is the last host in a host group
- When the selected iSCSI host does not belong to any host group and the host affinity setting has been configured for the target iSCSI host
- When the selected iSCSI host does not exist

2 Click the [OK] button.



→ Deletion of the iSCSI host starts.

3 Click the [Done] button to return to the [iSCSI Host] screen.

End of procedure

9.2.2.14 Delete SAS Host

This function deletes a SAS host.
When a SAS host belongs to a host group, the SAS host can be deleted, irrespective of its host affinity settings.

Caution

- Not all of the hosts can be deleted from a host group.
- When a SAS host does not belong to a host group, the SAS host, of which host affinity settings have been configured, cannot de deleted.

Note

When a host in the host group for which the host affinity settings are already configured is deleted, the path from the host to the port is also deleted.

The procedure to delete a SAS host is as follows:

Procedure

1 Select the SAS host to be deleted (multiple selections can be made) and click [Delete SAS Host] in [Action].

→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When the selected SAS host is the last host in a host group
- When the selected SAS host does not belong to any host group and the host affinity setting has been configured for the target SAS host
- When the selected SAS host does not exist

2 Click the [OK] button.



→ Deletion of the SAS host starts.

3 Click the [Done] button to return to the [SAS Host] screen.

End of procedure

9.2.2.15 Modify FC/FCoE Host

This function changes the FC/FCoE host information.

Caution

- When no FC/FCoE hosts are registered, the [Modify FC/FCoE Host] function cannot be used.
- When changing the WWN of an FC/FCoE host that is currently being used, make sure to stop access to that FC/FCoE host.
- The [Rename FC/FCoE Host] function that is provided with controller firmware version V10L24 or earlier is integrated in this function. Note that this function cannot change multiple FC/FCoE host names. Change one FC/FCoE host name at a time.

Note

- This function can change the following FC/FCoE host information; "Name" and "WWN". When the FC host is not registered in a host group, the "Host Response" setting can also be changed.
- When the FC host is registered in a host group, use the [Modify Host Group] function to change the host response. Refer to "9.2.2.6 Modify Host Group (FC/FCoE)" (page 463) for details.
- Both "FC host" and "FCoE host" are abbreviated as "FC host" in this section.

The procedure to change the FC host information is as follows:

Procedure

1 Select the FC host to change the host information for, and click [Modify FC/FCoE Host] in [Action].

2 Input new host information and click the [Modify] button.

- Name
  Input a new FC host name.
  An existing host name cannot be specified.
  The following input conditions apply:
  - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space
- WWN
  Input a new WWN.
  An existing WWN cannot be used.
  The following input conditions apply:
  - Hexadecimal numbers (0 - 9, A - F, a - f)
  - 16 characters
  - "F (f)" or "0" used in entire 16 characters are not allowed.

- Host Response
  Select a new host response that is to be assigned to the FC host.
  The host response list created in the ETERNUS DX Disk storage system is displayed.
  This item is available only when an FC host is not registered in the host group.
  - Solaris MPxIO
  - HP-UX
  - AIX EMPD (*1)
  - AIX VxVM
  - AIX Single Path
  - VS850/SVC
  - Host responses created in the ETERNUS DX Disk storage system
  - Default

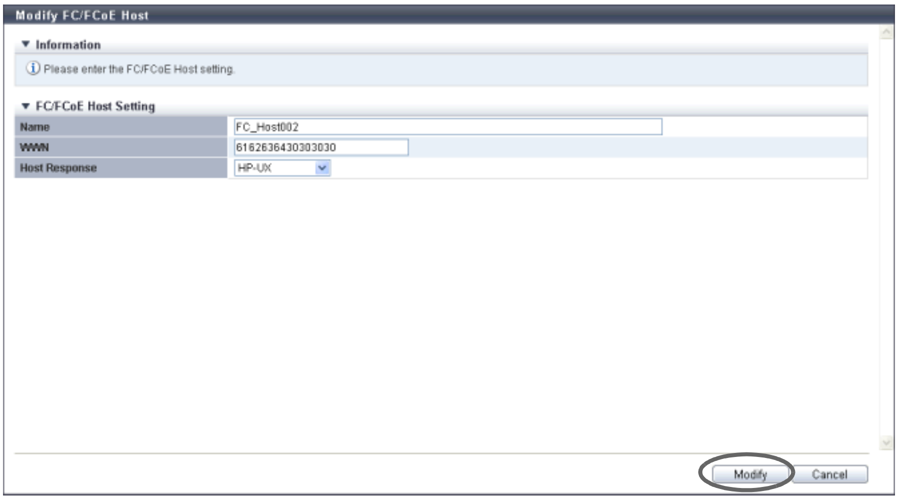
  *1: EMPD: ETERNUS Multipath Driver

Caution

If the host response is changed for an FC host that is configured with the host affinity setting, the LUNs may not be able to be accessed from the FC host. Make sure to check the current LUN settings and select a host response with an appropriate "Host Specific Mode" to change the host response.

LUN settings for LUN groups with host affinity settings	Host Specific Mode				
	Normal	AIX Mode	NR1000V Mode	HP-UX Mode	BS2000 Mode
LUN#0 – LUN#255	Available	Available	Available	Available	Available
LUN#0 - LUN#511	N/A	Available	Available	Available	Available
LUN#0 - LUN#1023	N/A	N/A	N/A	Available	Available
LUN#0 - LUN#4095	N/A	N/A	N/A	N/A	Available

Available: The host can recognize LUNs
N/A: The host cannot recognize some LUNs



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When the "Name" is not input
- When the "Name" does not satisfy the input conditions
- When the "Name" already exists
- When the "WWN" is not input
- When the "WWN" does not satisfy the input conditions
- When the same "WWN" is already registered
- When there are some LUNs that cannot be recognized from the FC host because the "Host Response" setting has been changed (only for FC hosts that are not registered in a host group)

3 Click the [OK] button.



→ Changing of the FC host information starts.

4 Click the [Done] button to return to the [FC/FCoE Host] screen.

End of procedure

9.2.2.16 Modify iSCSI Host

This function changes the iSCSI host information.

Caution

- When no iSCSI hosts are registered, the [Modify iSCSI Host] function cannot be used.
- When changing the information of an iSCSI host that is currently being used, make sure to stop access to that iSCSI host.
- The [Rename iSCSI Host] function that is provided with controller firmware version V10L24 or earlier is integrated in this function. Note that this function cannot change multiple iSCSI host names. Change one iSCSI host name at a time.

Note

- This function can change the following iSCSI host information; "Name", "iSCSI Name", "IP Version", "IP Address", "Alias Name", "CHAP User ID", and "CHAP Password". When the iSCSI host is not registered in a host group, the "Host Response" setting can also be changed.
- When the iSCSI host is registered in a host group, use the [Modify Host Group] function to change the host response. Refer to "9.2.2.7 Modify Host Group (iSCSI)" (page 470) for details.

The procedure to change the iSCSI information is as follows:

Procedure

1 Select the iSCSI host to changed the host information for, and click [Modify iSCSI Host] in [Action].

2 Input new iSCSI host information and click the [Modify] button.

- Name
  Input a new iSCSI host name.
  An existing host name cannot be specified.
  The following input conditions apply:
  - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space
- iSCSI Name
  Input an iSCSI name of the iSCSI host.
  The following input conditions apply:
  - Alphabetic characters (lower case) and numeric characters
  - Symbols "-" (hyphen), "." (period), and ":" (colon)
  - The name starts with "iqn." or "eui."
  - 4 - 223 characters
- Host Response
  Select a new host response that is to be assigned to the iSCSI host.
  The host response list created in the ETERNUS DX Disk storage system is displayed.
  This item is available only when an iSCSI host is not registered in the host group.
  - Solaris MPxIO
  - HP-UX
  - AIX EMPD (*1)
  - AIX VxVM
  - AIX Single Path
  - VS850/SVC
  - Host responses created in the ETERNUS DX Disk storage system
  - Default

*1: EMPD: ETERNUS Multipath Driver

Caution

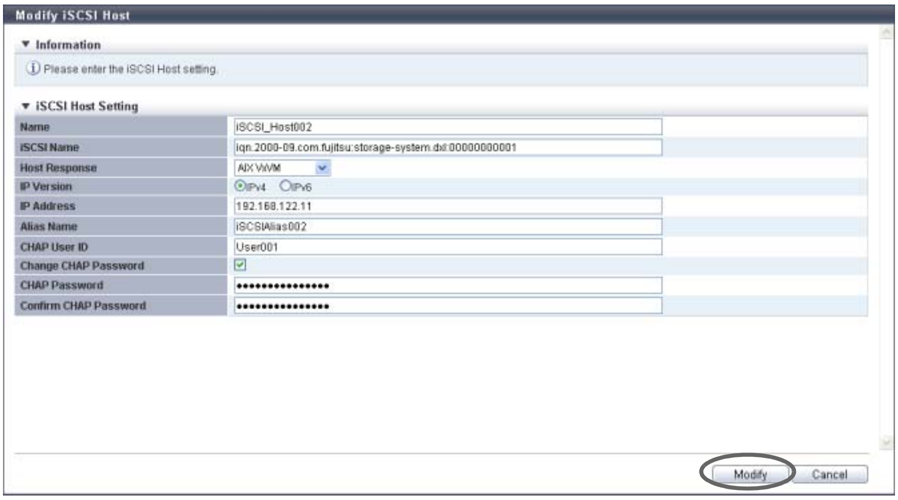
If the host response is changed for an iSCSI host that is configured with the host affinity setting, the LUNs may not be able to be accessed from the iSCSI host. Make sure to check the current LUN settings and select a host response with an appropriate "Host Specific Mode" to change the host response.

LUN settings for LUN groups with host affinity settings	Host Specific Mode				
	Normal	AIX Mode	NR1000V Mode	HP-UX Mode	BS2000 Mode
LUN#0 – LUN#255	Available	Available	Available	Available	Available
LUN#0 - LUN#511	N/A	Available	Available	Available	Available
LUN#0 - LUN#1023	N/A	N/A	N/A	Available	Available
LUN#0 - LUN#4095	N/A	N/A	N/A	N/A	Available

Available: The host can recognize LUNs
N/A: The host cannot recognize some LUNs

- IP Version
  Select the IP version of the iSCSI host from "IPv4" and "IPv6".
- IP Address
  Specify the IP address of the iSCSI host.
  There are two methods to specify an IP address; "IPv4" and "IPv6". The IP address must be specified with the selected IP version (IPv4 or IPv6). The following IPv6 addresses can be used; "link local address", "global address", "unique local address", and "6to4 address". Refer to "Available IPv6 Address" (page 757) for details. When the current setting is displayed, the IPv6 address is displayed as an abbreviation.
  It is not necessary to specify this item if IP address is not used.
  The following input conditions apply:
  - For IPv4 address
    xxx.xxx.xxx.xxx
    xxx: 1 - 255 for the top field (decimal)
    xxx: 0 - 255 for other fields (decimal)
  - For IPv6 address
    xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
    Refer to "IPv6 Address Notation" (page 378) for details.
- Alias Name
  Specify the Alias name of the iSCSI host. It is not necessary to specify this item if Alias name is not used. An existing Alias name cannot be specified.
  The following input conditions apply:
  - Up to 31 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space
- CHAP User ID
  Specify the user ID for CHAP Authentication. It is not necessary to specify this item if CHAP Authentication is not used.
  Configure the user ID and the password as a pair.
  The following input conditions apply:
  - Up to 255 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space

- Change CHAP Password
  To change the CHAP Authentication password, select the checkbox.
  Only when the "CHAP User ID" is registered, the field is available.
- CHAP Password
  Specify the password for CHAP Authentication. It is not necessary to specify this item if CHAP Authentication is not used.
  Configure the user ID and the password as a pair.
  The password can be entered only when the "Change CHAP Password" checkbox has been selected.
  The following input conditions apply:
  - 12 - 100 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space
- Confirm CHAP Password
  Input the CHAP password again for confirmation.
  The confirmation password can be entered only when the "Change CHAP Password" checkbox has been selected.
  The following input conditions apply:
  - 12 - 100 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space



→ A confirmation screen appears.

Caution

- An error screen appears in the following conditions:
  - When the "Name" is not input
  - When the "Name" does not satisfy the input conditions
  - When the "Name" already exists
  - When the "iSCSI Name" is not input
  - When the "iSCSI Name" does not satisfy the input conditions
  - When the "IP Address" does not satisfy the input conditions
  - When several iSCSI hosts with the same "IP Address" and "iSCSI Name" have been configured
  - When several iSCSI hosts have been specified with the same "iSCSI Name" when the IP addresses have not been entered
  - When the "Alias Name" does not satisfy the input conditions
  - When the "Alias Name" overlaps the existing Alias name
  - When the "CHAP User ID" does not satisfy the input conditions
  - When the "CHAP Password" does not satisfy the input conditions
  - When the "Confirm CHAP Password" does not satisfy the input conditions
  - When either of the "CHAP User ID" or the "CHAP Password" has been specified
  - When the "CHAP Password" and the "Confirm CHAP Password" do not match
  - When there are some LUNs that cannot be recognized from the iSCSI host because the "Host Response" setting has been changed (only for iSCSI hosts that are not registered in a host group)

3 Click the [OK] button.



→ Changing of the iSCSI host information starts.

4 Click the [Done] button to return to the [iSCSI Host] screen.

End of procedure

9.2.2.17 Modify SAS Host

This function changes the SAS host information.

Caution

- When no SAS hosts are registered, the [Modify SAS Host] function cannot be used.
- When changing the SAS address of a SAS host that is currently being used, make sure to stop access to that SAS host.
- The [Rename SAS Host] function that is provided with controller firmware version V10L24 or earlier is integrated in this function. Note that this function cannot change multiple SAS host names. Change one SAS host name at a time.

Note

- This function can change the following SAS host information; "Name" and "SAS Address". When the SAS host is not registered in a host group, the "Host Response" setting can also be changed.
- When the SAS host is registered in a host group, use the [Modify Host Group] function to change the host response. Refer to "9.2.2.8 Modify Host Group (SAS)" (page 480) for details.

The procedure to change the SAS host information is as follows:

Procedure

1 Select the SAS host to changed the host information for, and click [Modify SAS Host] in [Action].

2 Input new host information and click the [Modify] button.

- Name
  Input a new SAS host name. An existing host name cannot be specified.
  The following input conditions apply:
  - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space
- SAS Address
  Input a new SAS address. The same SAS address as another host cannot be used.
  The following input conditions apply:
  - 16 hexadecimal numbers
  - "F (f)" or "0" used in entire 16 characters are not allowed.

- Host Response
  Select a new host response that is to be assigned to the SAS host.
  The host response list created in the ETERNUS DX Disk storage system is displayed.
  This item is available only when a SAS host is not registered in the host group.
  - Solaris MPxIO
  - HP-UX
  - AIX EMPD (*1)
  - AIX VxVM
  - AIX Single Path
  - VS850/SVC
  - Host responses created in the ETERNUS DX Disk storage system
  - Default

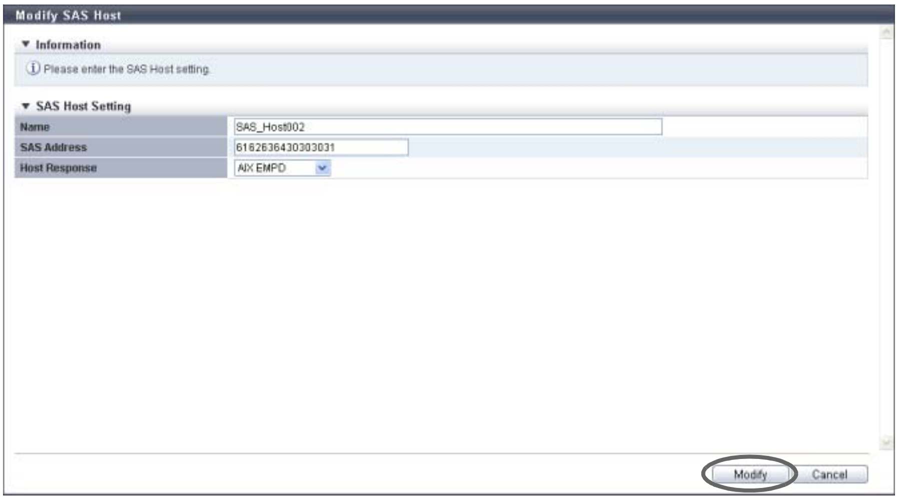
  *1: EMPD: ETERNUS Multipath Driver

Caution

If the host response is changed for a SAS host that is configured with the host affinity setting, the LUNs may not be able to be accessed from the SAS host. Make sure to check the current LUN settings and select a host response with an appropriate "Host Specific Mode" to change the host response.

LUN settings for LUN groups with host affinity settings	Host Specific Mode				
	Normal	AIX Mode	NR1000V Mode	HP-UX Mode	BS2000 Mode
LUN#0 – LUN#255	Available	Available	Available	Available	Available
LUN#0 - LUN#511	N/A	Available	Available	Available	Available
LUN#0 - LUN#1023	N/A	N/A	N/A	Available	Available
LUN#0 - LUN#4095	N/A	N/A	N/A	N/A	Available

Available: The host can recognize LUNs
N/A: The host cannot recognize some LUNs



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When the "Name" is not input
- When the "Name" does not satisfy the input conditions
- When the "Name" already exists
- When the "SAS Address" is not input
- When the "SAS Address" does not satisfy the input conditions
- When the same "SAS Address" is already registered
- When there are some LUNs that cannot be recognized from the SAS host because the "Host Response" setting has been changed (only for SAS hosts that are not registered in a host group)

3 Click the [OK] button.



→ Changing of the SAS host information starts.

4 Click the [Done] button to return to the [SAS Host] screen.

End of procedure

9.2.3 CA Port Group Management

CA Port Group management provides the following functions:

- Create FC Port Group
- Create iSCSI Port Group
- Create SAS Port Group
- Create FCoE Port Group
- Delete CA Port Group
- Modify CA Port Group
- Modify FC Port Parameters
- Modify iSCSI Port Parameters
- Modify SAS Port Parameters
- Modify FCoE Port Parameters
- Modify Port Mode

9.2.3.1 Create FC Port Group

This function creates a new FC port group, and registers the port to be a member.
An FC port group is a group of FC-CA type ports that are connected to the specified host group. This function configures the host affinity setting for each FC port group.

- The maximum number of port groups per storage system is 128, irrespective of the CA types.
- The maximum number of ports per port group is 8.
- A port can be a member of several port groups.

Caution

- Registration of the port is necessary to create a port group. A port group cannot be created if the port to be a member has not been registered from GUI.
- Only ports with "CA" or "CA/RA" as the port mode can be added to a port group. Ports with "RA" as the port mode cannot be added to a port group.
- A port with the affinity mode enabled ("ON") and a port with the affinity mode disabled ("OFF") cannot exist together in a port group.
  - The affinity mode ("ON" or "OFF") of a port group is decided when the host affinity setting has been configured on the corresponding port group. All of the member ports in a port group have the same affinity mode.
  - The affinity mode ("ON" or "OFF") of a port group is not changed until the host affinity setting has been released from the corresponding port group.
  - When one port is registered in several port groups, and the host affinity setting has been configured on one of the port groups including the corresponding port, the same affinity setting is configured on all the port groups, which include the corresponding port, and also on the member ports.
  - Ports without the host affinity setting can be members of a port group, regardless of whether the affinity mode for the group is enabled ("ON") or disabled ("OFF").

Note

- To change the settings of a port groups, refer to "9.2.3.6 Modify CA Port Group" (page 528).
- To add a port to an existing port group, refer to "9.2.3.6 Modify CA Port Group" (page 528).
- To change the port mode from "RA" to "CA", refer to "9.2.3.11 Modify Port Mode" (page 571).

The procedure to create an FC port group is as follows:

Procedure

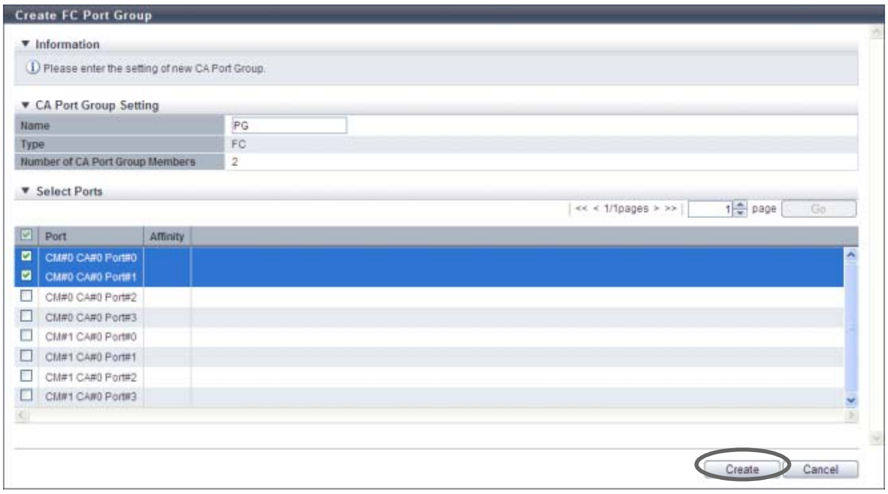
1 Click [Create FC Port Group] in [Action].

2 Specify the name of the port group to be created, select all the ports to be registered in the port group, and click the [Create] button.

- Name
  Specify the port group name.
  An existing port group name cannot be specified.
  The following input conditions apply:
  - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space
- Checkbox to select ports
  Select the checkbox of the FC port to be registered in an FC port group.

Caution

- When a port that has the affinity mode enabled ("ON") is selected, ports that have the affinity mode disabled ("OFF") cannot be selected.
- When a port that has the affinity mode disabled ("OFF") is selected, ports that have the affinity mode enabled ("ON") cannot be selected.
- Up to eight ports can be selected.

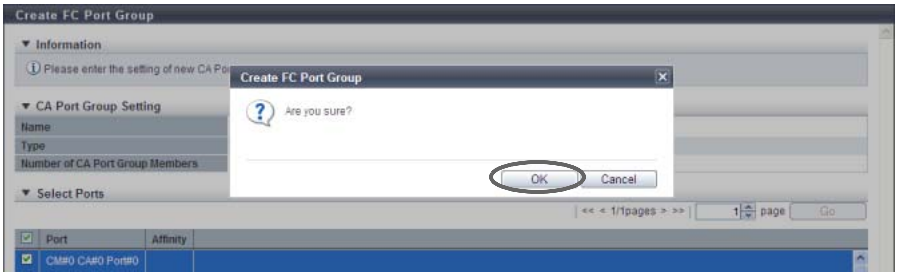


→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:
- When the port group name does not satisfy the input conditions
- When the port group name has not been entered

3 Click the [OK] button.



→ Registration of the FC port group starts.

Caution

An error screen appears in the following conditions:

- When the port group name overlaps with an existing port group name (port group names cannot overlap with any other port group names, irrespective of the CA types)
- When the total number of ports has exceeded the maximum number for the ETERNUS DX Disk storage system
- When no ports are registered in a port group, or when nine or more ports are registered in a port group
- When the specified port does not exist in the ETERNUS DX Disk storage system
- When the port mode of the selected port is other than "FC"
- When there are ports of which affinity mode is enabled ("ON") and disabled ("OFF") existing together

4 Click the [Done] button to return to the [CA Port Group] screen.

End of procedure

9.2.3.2 Create iSCSI Port Group

This function creates a new iSCSI port group, and registers the port to be a member.
An iSCSI port group is a group of iSCSI-CA type ports that are connected to the specified host group. This function configures the host affinity setting for each iSCSI port group.

- The maximum number of port groups per storage system is 128, irrespective of the CA types.
- The maximum number of ports per port group is 8.
- A port can be a member of several port groups.

Caution

- Registration of the port is necessary to create a port group. A port group cannot be created if the port to be a member has not been registered from GUI.
- Only ports with "CA" or "CA/RA" as the port mode can be added to a port group. Ports with "RA" as the port mode cannot be added to a port group.
- A port with the affinity mode enabled ("ON") and a port with the affinity mode disabled ("OFF") cannot exist together in a port group.
  - The affinity mode ("ON" or "OFF") of a port group is decided when the host affinity setting has been configured on the corresponding port group. All of the member ports in a port group have the same affinity mode.
  - The affinity mode ("ON" or "OFF") of a port group is not changed until the host affinity setting has been released from the corresponding port group.
  - When one port is registered in several port groups, and the host affinity setting has been configured on one of the port groups including the corresponding port, the same affinity setting is configured on all the port groups, which include the corresponding port, and also on the member ports.
  - Ports without the host affinity setting can be members of a port group, regardless of whether the affinity mode for the group is enabled ("ON") or disabled ("OFF").

Note

- To change the settings of a port groups, refer to "9.2.3.6 Modify CA Port Group" (page 528).
- To add a port to an existing port group, refer to "9.2.3.6 Modify CA Port Group" (page 528).
- To change the port mode from "RA" to "CA", refer to "9.2.3.11 Modify Port Mode" (page 571).

The procedure to create an iSCSI port group is as follows:

Procedure

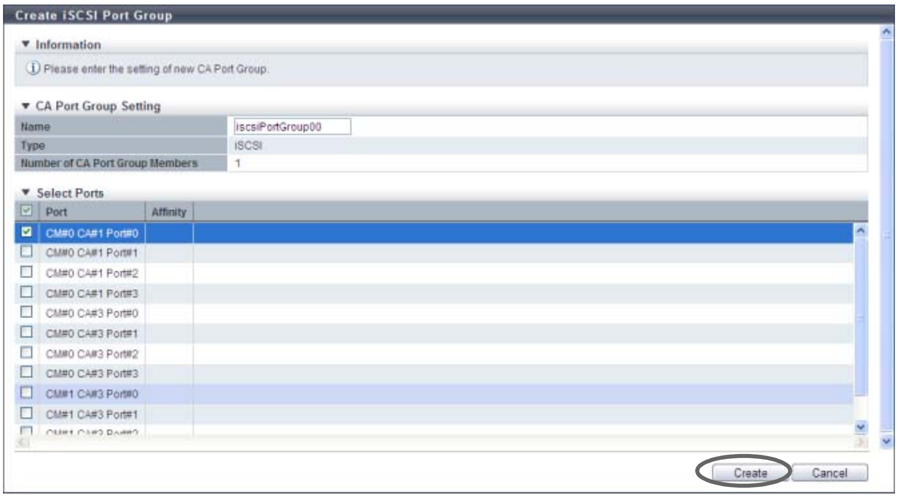
1 Click [Create iSCSI Port Group] in [Action].

2 Specify the name of the port group to be created, select all the ports to be registered in the port group, and click the [Create] button.

- Name
  Specify the port group name.
  An existing port group name cannot be specified.
  The following input conditions apply:
  - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space
- Checkbox to select ports
  Select the checkbox of the iSCSI port to be registered in an iSCSI port group.

Caution

- When a port that has the affinity mode enabled ("ON") is selected, ports that have the affinity mode disabled ("OFF") cannot be selected.
- When a port that has the affinity mode disabled ("OFF") is selected, ports that have the affinity mode enabled ("ON") cannot be selected.
- Up to eight ports can be selected.



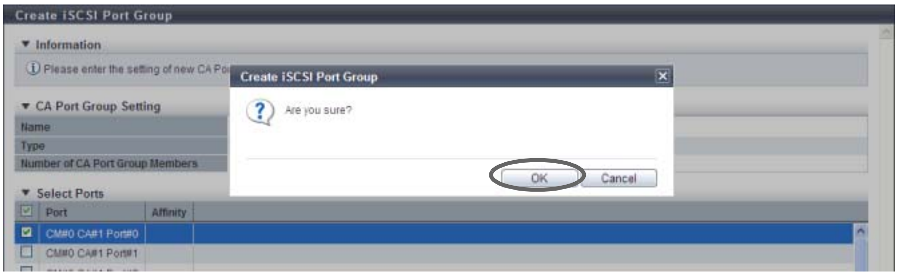
→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When the port group name does not satisfy the input conditions
- When the port group name has not been entered

3 Click the [OK] button.



→ Registration of the iSCSI port group starts.

Caution

An error screen appears in the following conditions:
- When the port group name overlaps with an existing port group name (port group names cannot overlap with any other port group names, irrespective of the CA types)
- When the total number of ports has exceeded the maximum number for the ETERNUS DX Disk storage system
- When no ports are registered in a port group, or when nine or more ports are registered in a port group
- When the specified port does not exist in the ETERNUS DX Disk storage system
- When the port mode of the selected port is other than "iSCSI"
- When the port mode of the selected port is other than "CA"
- When there are ports of which affinity mode is enabled ("ON") and disabled ("OFF") existing together

4 Click the [Done] button to return to the [CA Port Group] screen.

End of procedure

9.2.3.3 Create SAS Port Group

This function creates a new SAS port group, and registers the port to be a member.
A SAS port group is a group of SAS-CA type ports that are connected to the specified host group. This function configures the host affinity setting for each SAS port group.

- The maximum number of port groups per storage system is 128, irrespective of the CA types.
- The maximum number of ports per port group is 8.
- A port can be a member of several port groups.

Caution

- Registration of the port is necessary to create a port group. A port group cannot be created if the port to be a member has not been registered from GUI.
- A port with the affinity mode enabled ("ON") and a port with the affinity mode disabled ("OFF") cannot exist together in a port group.
  - The affinity mode ("ON" or "OFF") of a port group is decided when the host affinity setting has been configured on the corresponding port group. All of the member ports in a port group have the same affinity mode.
  - The affinity mode ("ON" or "OFF") of a port group is not changed until the host affinity setting has been released from the corresponding port group.
  - When one port is registered in several port groups, and the host affinity setting has been configured on one of the port groups including the corresponding port, the same affinity setting is configured on all the port groups, which include the corresponding port, and also on the member ports.
  - Ports without the host affinity setting can be members of a port group, regardless of whether the affinity mode for the group is enabled ("ON") or disabled ("OFF").

Note

- To change the settings of a port groups, refer to "9.2.3.6 Modify CA Port Group" (page 528).
- To add a port to an existing port group, refer to "9.2.3.6 Modify CA Port Group" (page 528).

The procedure to create a SAS port group is as follows:

Procedure

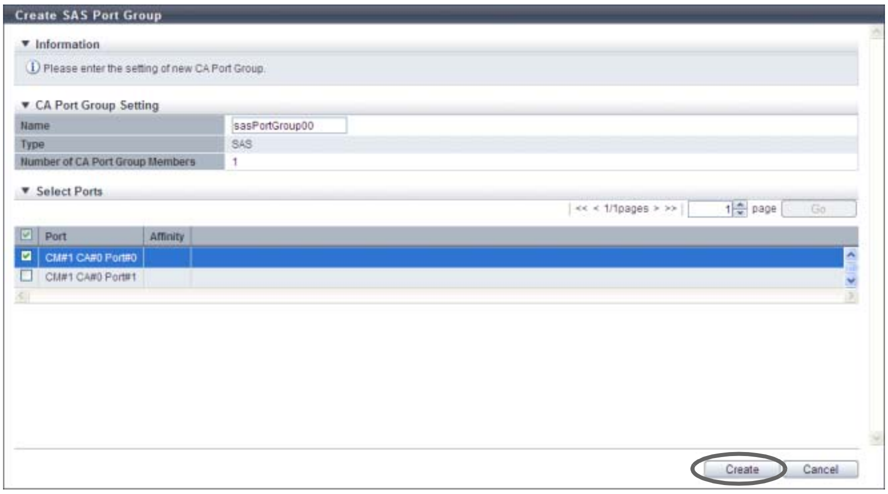
1 Click [Create SAS Port Group] in [Action].

2 Specify the name of the port group to be created, select all the ports to be registered in the port group, and click the [Create] button.

- Name
  Specify the port group name.
  An existing port group name cannot be specified.
  The following input conditions apply:
  - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space
- Checkbox to select ports
  Select the checkbox of the SAS port to be registered in a SAS port group.

Caution

- When a port that has the affinity mode enabled ("ON") is selected, ports that have the affinity mode disabled ("OFF") cannot be selected.
- When a port that has the affinity mode disabled ("OFF") is selected, ports that have the affinity mode enabled ("ON") cannot be selected.
- Up to eight ports can be selected.



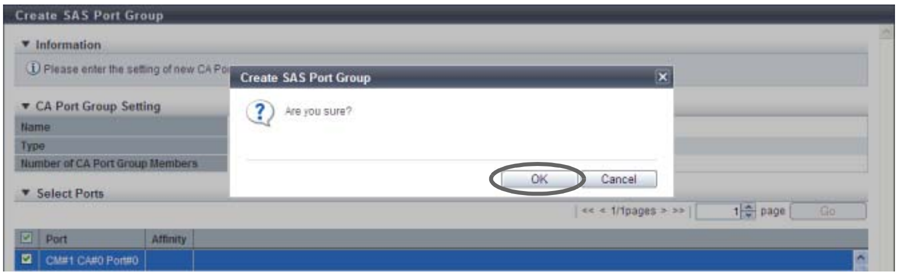
→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When the port group name does not satisfy the input conditions
- When the port group name has not been entered

3 Click the [OK] button.



→ Registration of the SAS port group starts.

Caution

An error screen appears in the following conditions:

- When the port group name overlaps with an existing port group name (port group names cannot overlap with any other port group names, irrespective of the CA types)
- When the total number of ports has exceeded the maximum number for the ETERNUS DX Disk storage system
- When no ports are registered in a port group, or when nine or more ports are registered in a port group
- When the specified port does not exist in the ETERNUS DX Disk storage system
- When the port mode of the selected port is other than "SAS"
- When there are ports of which affinity mode is enabled ("ON") and disabled ("OFF") existing together

4 Click the [Done] button to return to the [CA Port Group] screen.

End of procedure

9.2.3.4 Create FCoE Port Group

This function creates a new FCoE port group, and registers the port to be a member.
An FCoE port group is a group of FCoE-CA type ports that are connected to the specified host group. This function configures the host affinity setting for each FCoE port group.

- The maximum number of port groups per storage system is 128, irrespective of the CA types.
- The maximum number of ports per port group is 8.
- A port can be a member of several port groups.

Caution

- Registration of the port is necessary to create a port group. A port group cannot be created if the port to be a member has not been registered from GUI.
- A port with the affinity mode enabled ("ON") and a port with the affinity mode disabled ("OFF") cannot exist together in a port group.
  - The affinity mode ("ON" or "OFF") of a port group is decided when the host affinity setting has been configured on the corresponding port group. All of the member ports in a port group have the same affinity mode.
  - The affinity mode ("ON" or "OFF") of a port group is not changed until the host affinity setting has been released from the corresponding port group.
  - When one port is registered in several port groups, and the host affinity setting has been configured on one of the port groups including the corresponding port, the same affinity setting is configured on all the port groups, which include the corresponding port, and also on the member ports.
  - Ports without the host affinity setting can be members of a port group, regardless of whether the affinity mode for the group is enabled ("ON") or disabled ("OFF").

Note

- To change the settings of a port groups, refer to "9.2.3.6 Modify CA Port Group" (page 528).
- To add a port to an existing port group, refer to "9.2.3.6 Modify CA Port Group" (page 528).

The procedure to create an FCoE port group is as follows:

Procedure

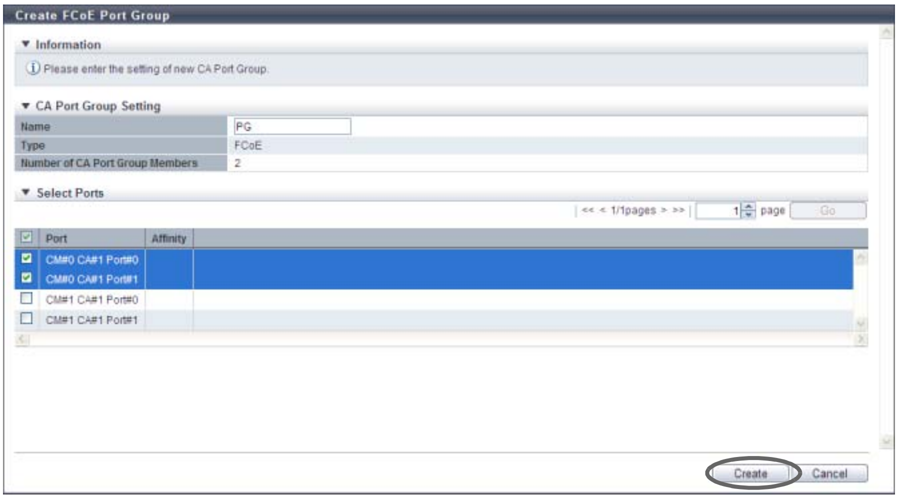
1 Click [Create FCoE Port Group] in [Action].

2 Specify the name of the port group to be created, select all the ports to be registered in the port group, and click the [Create] button.

- Name
  Specify the port group name.
  An existing port group name cannot be specified.
  The following input conditions apply:
  - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space
- Checkbox to select ports
  Select the checkbox of the FCoE port to be registered in an FCoE port group.

Caution

- When a port that has the affinity mode enabled ("ON") is selected, ports that have the affinity mode disabled ("OFF") cannot be selected.
- When a port that has the affinity mode disabled ("OFF") is selected, ports that have the affinity mode enabled ("ON") cannot be selected.
- Up to eight ports can be selected.



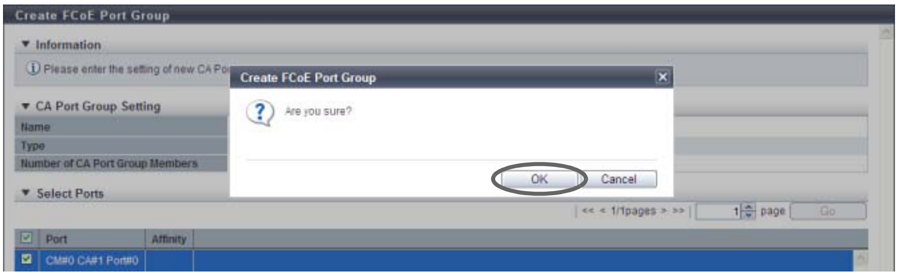
→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When the port group name does not satisfy the input conditions
- When the port group name has not been entered

3 Click the [OK] button.



→ Registration of the FCoE port group starts.

Caution

An error screen appears in the following conditions:

- When the port group name overlaps with an existing port group name (port group names cannot overlap with any other port group names, irrespective of the CA types)
- When the total number of ports has exceeded the maximum number for the ETERNUS DX Disk storage system
- When no ports are registered in a port group, or when nine or more ports are registered in a port group
- When the specified port does not exist in the ETERNUS DX Disk storage system
- When the port mode of the selected port is other than "FCoE"
- When there are ports of which affinity mode is enabled ("ON") and disabled ("OFF") existing together

4 Click the [Done] button to return to the [CA Port Group] screen.

End of procedure

9.2.3.5 Delete CA Port Group

This function deletes a CA port group. When a CA port group is deleted, the ports, which belong to the CA port group, are also deleted.

Caution

CA port groups that are being used for the host affinity settings cannot be deleted.

The procedure to delete a CA port group is as follows:

Procedure

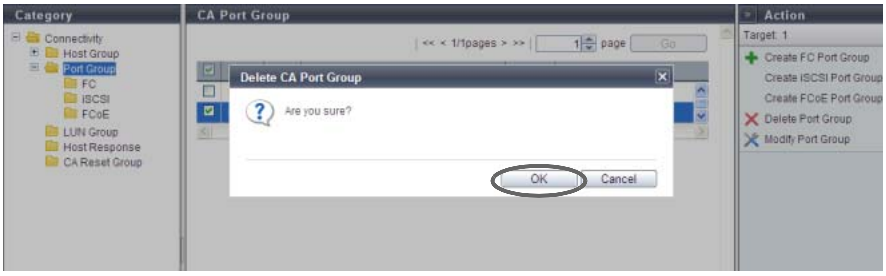
1 Select the CA port group to be deleted (multiple selections can be made) and click [Delete Port Group] in [Action].

→ A confirmation screen appears.

Caution

The CA port group, of which host affinity settings have been configured (the status of the port group is "Active"), cannot be deleted.

2 Click the [OK] button.



→ Deletion of the CA port group starts.

3 Click the [Done] button to return to the [CA Port Group] screen.

End of procedure

9.2.3.6 Modify CA Port Group

This function performs the following modifications for existing CA port groups:

- CA Port Group Name
- Port (Add and delete member ports in a CA port group)

Ports can be added to CA port groups for which the host affinity setting is already configured and ports can also be deleted from CA port groups.
If a port has been added, the host affinity setting is automatically configured to the corresponding port as a CA port group member.
If a port has been deleted, the host affinity setting is cleared from the corresponding port.

- The maximum number of CA port groups per storage system is 128, irrespective of the CA types.
- The maximum number of ports per CA port group is 8.
- A port can be a member of several CA port groups.

Caution

- Registration of the port is necessary to create a CA port group. Not all of the ports can be deleted from a CA port group.
- Only ports with "CA" or "CA/RA" as the port mode can be added to a CA port group. The ports, of which port mode is "RA", cannot be added to the CA port group.
- A port with the affinity mode enabled ("ON") and a port with the affinity mode disabled ("OFF") cannot exist together in a CA port group.
    - The affinity mode ("ON" or "OFF") of a CA port group is decided when the host affinity setting has been configured on the corresponding CA port group. All of the member ports in a CA port group have the same affinity mode.
    - The affinity mode ("ON" or "OFF") of a CA port group is not changed until the host affinity setting has been released from the corresponding CA port group.
    - When one port is registered in several CA port groups, and the host affinity setting has been configured on one of the CA port groups including the corresponding port, the same affinity setting is configured on all the CA port groups, which include the corresponding port, and also on the member ports.
    - Ports without the host affinity setting can be members of a CA port group, regardless of whether the affinity mode for the host group is enabled ("ON") or disabled ("OFF").

Note

- When a port was added to a CA port group, of which the host affinity setting has been configured, paths between all the hosts with the host affinity setting and the added port will be configured. To modify the path between a host and a port, refer to "9.2.1.3 Modify Host Affinity" (page 428).
- When a port in the CA port group for which the host affinity settings are already configured is deleted, the path from the host to the port is also deleted.
- When creating a new CA port group and registering a port in the CA port group, refer to "9.2.3.1 Create FC Port Group" (page 517), "9.2.3.2 Create iSCSI Port Group" (page 519), "9.2.3.3 Create SAS Port Group" (page 522), or "9.2.3.4 Create FCoE Port Group" (page 525) depending on the CA port type.
- To change the CA port mode to "CA" or "CA/RA", refer to "9.2.3.11 Modify Port Mode" (page 571).

The procedure to modify a CA port group is as follows:

Procedure

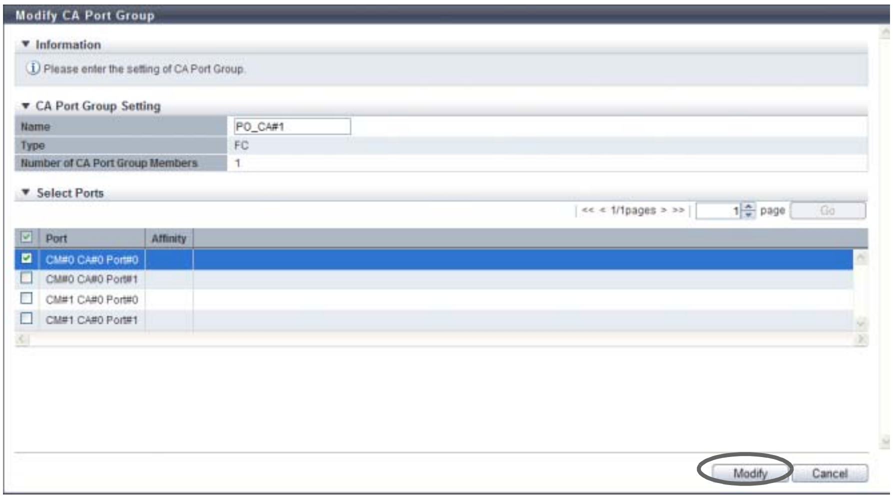
1 Select the CA port group to be changed, and click [Modify Port Group] in [Action].

2 Specify the new name of the CA port group, add a port to the CA port group (select the checkbox), or delete a port from the CA port group (clear the checkbox), and click the [Modify] button.

- Name
  Specify the CA port group name.
  An existing CA port group name cannot be specified.
  The following input conditions apply:
  - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space
- Checkbox to select ports
  The checkbox of the port, which has been registered in the CA port group, is selected.
  Select the port checkbox to be added to a CA port group. Clear the port checkbox to be deleted from a CA port group.

Caution

- If the CA port group's affinity mode is "ON" (the affinity mode of all the selected ports is "ON"), the port, of which affinity mode is "OFF", cannot be selected.
- If the CA port group's affinity mode is "OFF" (the affinity mode of all the selected ports is "OFF"), the port, of which affinity mode is "ON", cannot be selected.
- Up to eight ports can be selected.

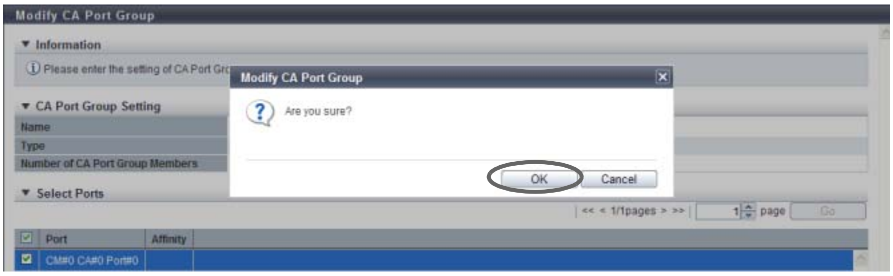


→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:
- When the CA port group name does not satisfy the input conditions
- When the CA port group name has not been entered

3 Click the [OK] button.



→ Modification of the CA port group starts.

> **Caution**
>
> An error screen appears in the following conditions:
>
> - When the CA port group name overlaps with an existing CA port group name (port group names cannot overlap with any other CA port group names, irrespective of the CA types)
> - When no ports are registered in a CA port group, or when nine or more ports are registered in a CA port group
> - When the specified port does not exist in the ETERNUS DX Disk storage system
> - When the CA type of the selected port differs from the CA type of the existing ports in the CA port group
> - When the port mode of the selected port is other than "CA"
> - When there are ports of which affinity mode is enabled ("ON") and disabled ("OFF") existing together
> - When the affinity mode ("ON" or "OFF") of the selected port differs from the affinity mode of the existing ports in the CA port group

4 Click the [Done] button to return to the [CA Port Group] screen.

End of procedure

9.2.3.7 Modify FC Port Parameters

This function sets the FC port connection information between the ETERNUS DX Disk storage system and a host, between local and remote devices for REC, or between source and destination storage systems for Storage Migration.

> **Caution**
>
> - When changing port parameters during operation, stop access from the server that is connected to the target port. Host access does not need to be stopped to change the port parameters of newly added CA ports.
> - The port parameters of an FC-Initiator port that has Storage Migration paths cannot be changed.

Note

- There are four types of port modes for FC ports; CA, RA, CA/RA, and Initiator. CA is used for connecting to a server, RA is used for REC, CA/RA is used for connecting to a server and for REC, and Initiator is used for Storage Migration. To change the port mode, refer to "9.2.3.11 Modify Port Mode" (page 571). The default value is "CA".
- For more details on the parameter settings of FC-CA, refer to "User's Guide -Server Connection-" for each OS type.
- When changing the port parameters for FC-Initiator port, delete the path group specified in the target port. Refer to "11.2.11.3 Delete Storage Migration Path" (page 914) for details.

The procedure to set FC port parameters is as follows:

Procedure

1 Select which FC port to set the parameters for (multiple selections can be made) and click [Configure FC Port] in [Action].

Note

Multiple selections can be made from FC ports that have the same "Type" and "Port Mode". To set the same parameters for multiple ports, set the parameters of the copy source port and click the [Copy] button. Select the copy destination port and click the [Copy] button. The parameters can be copied. Note that the "Loop ID" that is specified for "Set Loop ID (Manual)" is not copied.
To set different parameters to multiple ports, select each target port and set the parameters.

2 Set the parameters for all of the selected ports and click the [Set] button.

The settings of port parameters vary depending on the port mode ("When the port mode is "CA" or "CA/RA"" (page 532), "When the port mode is "RA"" (page 536), or "When the port mode is "Initiator"" (page 539)).

■ When the port mode is "CA" or "CA/RA"

- Port
  Select the target port or select the copy source port.
  The selectable port locations are displayed as options:
  - CM#x CA#y Port#z (x: CM number, y: CA number, z: Port number)
- Connection
  Select the connection topology for the target port from the "Fabric" or "FC-AL".
  When "FC-AL" is selected, it is necessary to assign a Loop ID to the port.
  - Fabric
    A connection type that enables simultaneous communication among multiple nodes through a Fibre Channel switch. This connection type can also be used for a direct connection when "Transfer Rate" is "16 Gbit/s".
  - FC-AL
    A connection type that connects multiple nodes in a loop.
    This connection type is used for a direct connection when "Transfer Rate" is 8Gbit/s or less.

Caution

Select "Fabric" for a direct connection when "Transfer Rate" is "16 Gbit/s".

- Set Loop ID
  When "Connection" is "FC-AL", select "Manual" or "Auto" as the specification method for the Loop ID. "Loop ID" is an identification number of a node in a loop.
- Loop ID
  - Manual
    When the "Set Loop ID" is "Manual", enter the Loop ID.
    The Loop ID must have a value that is different from the values of all the ports.
    The following input condition applies:
    - 0x0 - 0x7D
  - Auto
    When the "Set Loop ID" is "Auto", select "Ascending" or "Descending".
- Transfer Rate
  Select the transfer speed for the target port. The available transfer rate varies according to the selected port type and connection topology.
  - Auto-negotiation
  - 1 Gbit/s (Not supported)
  - 2 Gbit/s (Not supported when "Type" is "16G FC")
  - 4 Gbit/s
  - 8 Gbit/s
  - 16 Gbit/s (Not supported when "Type" is "8G FC" or when "Type" is "16G FC" and "Connection" is "FC-AL")

Caution

- Select "Auto-negotiation", "2 Gbit/s", "4 Gbit/s", "8 Gbit/s", or "16 Gbit/s" for "Transfer Rate". Note that "1 Gbit/s" is not supported.
- "Auto-negotiation" is selected for "Transfer Rate" when "Type" is "16G FC", "Transfer Rate" is "16 Gbit/s", and "Connection" is changed from "Fabric" to "FC-AL".

- Frame Size
  Select the frame size of the target port.
  "Frame Size" specifies the length of the communication information.
  - 512 bytes
  - 1024 bytes
  - 2048 bytes
- Reset Scope
  Specify the reset scope of the target port.
  Reset scope is the range where the command reset from the server is performed, when the target port is connected to multiple servers.
  - I_T_L (I: Initiator, T: Target, L: LUN)
    Reset (cancel) the command request from the server that sent the command reset request.
  - T_L (T: Target, L: LUN)
    Reset (cancels) the command request from all of the servers that are connected to the port.

- Release Reservation if Chip is Reset
  Select whether to "Enable" or "Disable" the function to release the reserved status of the volume when the target port (chip) is reset.
- REC Line No.
  Select the REC line number of the target port.
  The REC line number is used to switch the communication path when a line fails. The REC line number is used to recognize failed lines. Set different REC line numbers for each physical communication path. When lines are in normal status, an REC can be performed regardless of the REC line number (specifying the same REC line numbers is allowed) in the same way as conventional REC operations. Note that no priority applies to REC line numbers.

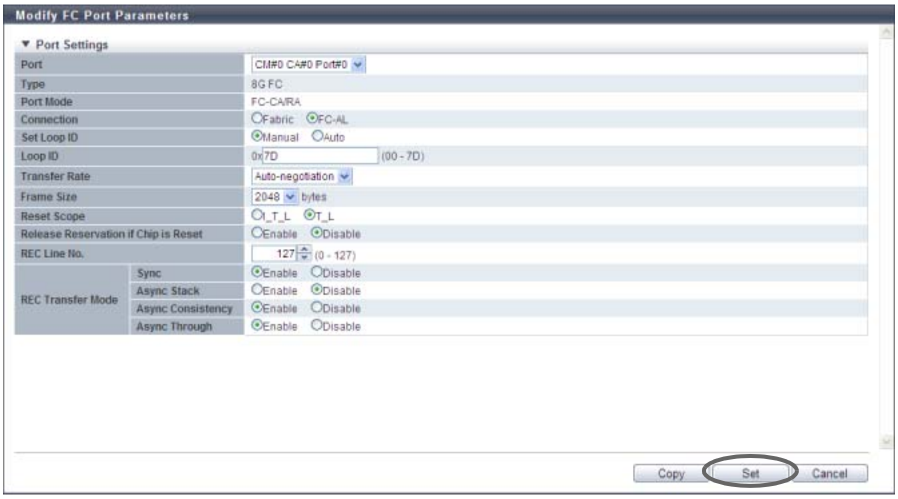
  Caution

  - This item is displayed only when "Port Mode" is "CA/RA".
  - When a line fails, the communication path is switched according to the REC line number of the copy source storage system. For normal operation, set the same REC line number for the copy source and the copy destination storage systems to recover data.
  - If the port mode has been changed from "CA/RA" to "CA" or "Initiator", the REC line number returns to the default setting ("0"). When the port mode has changed from "CA/RA" to "RA", the current REC line number setting is retained. Refer to "9.2.3.11 Modify Port Mode" (page 571) for details.

- REC Transfer Mode
  Select which REC transfer mode is enabled or disabled for the target port.
  When "Enable" is selected, an REC is performed in the selected transfer mode for the target port.
  When "Disable" is selected, an REC is not performed in the selected transfer mode for the target port.
  To set the REC transfer mode for the specific port, enable the appropriate mode. For example, specify different ports for Consistency and Stack to perform data transfers without any interference.
  The current setting is retained even when an REC path is changed. When "Enable" is selected for all of the REC transfer modes (default setting), a conventional REC is performed.
  - Sync (REC in synchronous transfer mode)
  - Async Stack (REC in asynchronous stack mode)
  - Async Consistency (REC in asynchronous consistency mode)
  - Async Through (REC in asynchronous through mode)

Caution

- This item is displayed only when "Port Mode" is "CA/RA".
- The REC transfer mode can be changed without suspending a copy session even when an REC is being performed in the target port. The changed settings are applied immediately to the ETERNUS DX Disk storage system.
- If specific REC transfer modes for all the RA ports and the CA/RA ports are disabled, a copy session with a disabled REC transfer mode fails because the REC paths for all the RA ports and the CA/RA ports are regarded as being blocked. When the REC transfer mode for a copy session that is being performed is disabled, this copy session is halted.
- When "Async Consistency" is disabled for all the RA ports and the CA/RA ports, the REC buffer status changes to "INACTIVE".
- For normal operations, set the same REC transfer mode for the copy source and the copy destination storage systems to recover data. When the REC transfer mode is specified for a copy source storage system, the specified REC transfer mode is performed even if the controller firmware version of the copy destination storage system is V10L49 or earlier or when the copy destination storage system is an old storage system (ETERNUS DX90, ETERNUS DX410/DX440, ETERNUS DX8100/DX8400/DX8700, ETERNUS4000, or ETERNUS8000).
- If the port mode has changed from "CA/RA" to "CA" or "Initiator", the REC transfer mode returns to the default setting ("Enable"). When the port mode has changed from "CA/RA" to "RA", the current REC transfer mode setting is retained. Refer to "9.2.3.11 Modify Port Mode" (page 571) for details.



■ When the port mode is "RA"

- Port
  Select the target port or select the copy source port.
  The selectable port locations are displayed as options:
  - CM#x CA#y Port#z (x: CM number, y: CA number, z: Port number)
- Connection
  Select the connection topology for the target port from the "Fabric" or "FC-AL".
  When "FC-AL" is selected, it is necessary to assign a Loop ID to the port.
  - Fabric
    A connection type that enables simultaneous communication among multiple nodes through a Fibre Channel switch. This connection type can also be used for a direct connection when "Transfer Rate" is "16 Gbit/s".
  - FC-AL
    A connection type that connects multiple nodes in a loop.
    This connection type is used for a direct connection when "Transfer Rate" is 8Gbit/s or less.

Caution

Select "Fabric" for a direct connection when "Transfer Rate" is "16 Gbit/s".

- Set Loop ID
  When "Connection" is "FC-AL", select "Manual" or "Auto" as the specification method for the Loop ID.
  "Loop ID" is an identification number of a node in a loop.
- Loop ID
  - Manual
    When the "Set Loop ID" is "Manual", enter the Loop ID.
    The Loop ID must have a value that is different from the values of all the ports.
    The following input condition applies:
    - 0x0 - 0x7D
  - Auto
    When the "Set Loop ID" is "Auto", select "Ascending" or "Descending".
- Transfer Rate
  Select the transfer speed for the target port. The available transfer rate varies according to the selected port type and connection topology.
  - Auto-negotiation
  - 1 Gbit/s (Not supported)
  - 2 Gbit/s (Not supported when "Type" is "16G FC")
  - 4 Gbit/s
  - 8 Gbit/s
  - 16 Gbit/s (Not supported when "Type" is "8G FC" or when "Type" is "16G FC" and "Connection" is "FC-AL")

Caution

- Select "Auto-negotiation", "2 Gbit/s", "4 Gbit/s", "8 Gbit/s", or "16 Gbit/s" for "Transfer Rate". Note that "1 Gbit/s" is not supported.
- "Auto-negotiation" is selected for "Transfer Rate" when "Type" is "16G FC", "Transfer Rate" is "16 Gbit/s", and "Connection" is changed from "Fabric" to "FC-AL".

- Frame Size
  Select the frame size of the target port.
  "Frame Size" specifies the length of the communication information.
  - 512 bytes
  - 1024 bytes
  - 2048 bytes
- REC Line No.
  Select the REC line number of the target port.
  The REC line number is used to switch the communication path when a line fails. The REC line number is used to recognize failed lines. Set different REC line numbers for each physical communication path. When lines are in normal status, an REC can be performed regardless of the REC line number (specifying the same REC line numbers is allowed) in the same way as conventional REC operations. Note that no priority applies to REC line numbers.

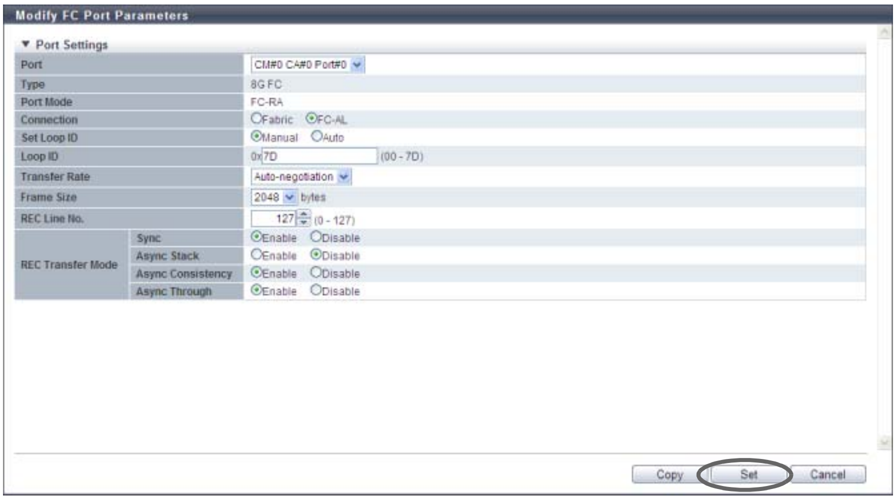
Caution

- When a line fails, the communication path is switched according to the REC line number of the copy source storage system. For normal operation, set the same REC line number for the copy source and the copy destination storage systems to recover data.
- If the port mode has been changed from "RA" to "CA" or "Initiator", the REC line number returns to the default setting ("0"). When the port mode has changed from "RA" to "CA/RA", the current REC line number setting is retained. Refer to "9.2.3.11 Modify Port Mode" (page 571) for details.

- REC Transfer Mode
  Select which REC transfer mode is enabled or disabled for the target port.
  When "Enable" is selected, an REC is performed in the selected transfer mode for the target port.
  When "Disable" is selected, an REC is not performed in the selected transfer mode for the target port.
  To set the REC transfer mode for the specific port, enable the appropriate mode. For example, specify different ports for Consistency and Stack to perform data transfers without any interference.
  The current setting is retained even when an REC path is changed. When "Enable" is selected for all of the REC transfer modes (default setting), a conventional REC is performed.
  - Sync (REC in synchronous transfer mode)
  - Async Stack (REC in asynchronous stack mode)
  - Async Consistency (REC in asynchronous consistency mode)
  - Async Through (REC in asynchronous through mode)

Caution

- The REC transfer mode can be changed without suspending a copy session even when an REC is being performed in the target port. The changed settings are applied immediately to the ETERNUS DX Disk storage system.
- If specific REC transfer modes for all the RA ports and the CA/RA ports are disabled, a copy session with a disabled REC transfer mode fails because the REC paths for all the RA ports and the CA/RA ports are regarded as being blocked. When the REC transfer mode for a copy session that is being performed is disabled, this copy session is halted.
- When "Async Consistency" is disabled for all the RA ports and the CA/RA ports, the REC buffer status changes to "INACTIVE".
- For normal operations, set the same REC transfer mode for the copy source and the copy destination storage systems to recover data. When the REC transfer mode is specified for a copy source storage system, the specified REC transfer mode is performed even if the controller firmware version of the copy destination storage system is V10L49 or earlier or when the copy destination storage system is an old storage system (ETERNUS DX90, ETERNUS DX410/DX440, ETERNUS DX8100/DX8400/DX8700, ETERNUS4000, or ETERNUS8000).
- If the port mode has changed from "RA" to "CA" or "Initiator", the REC transfer mode returns to the default setting("Enable"). When the port mode has changed from "RA" to "CA/RA", the current REC transfer mode setting is retained. Refer to "9.2.3.11 Modify Port Mode" (page 571) for details.



■ When the port mode is "Initiator"

- Port
  Select the target port or select the copy source port.
  The selectable port locations are displayed as options:
  - CM#x CA#y Port#z (x: CM number, y: CA number, z: Port number)
- Connection
  Select the connection topology for the target port from the "Fabric" or "FC-AL".
  When "FC-AL" is selected, it is necessary to assign a Loop ID to the port.
  - Fabric
    A connection type that enables simultaneous communication among multiple nodes through a Fibre Channel switch. This connection type can also be used for a direct connection when "Transfer Rate" is "16 Gbit/s".
  - FC-AL
    A connection type that connects multiple nodes in a loop.
    This connection type is used for a direct connection when "Transfer Rate" is 8Gbit/s or less.

Caution

Select "Fabric" for a direct connection when "Transfer Rate" is "16 Gbit/s".

- Set Loop ID
  When "Connection" is "FC-AL", select "Manual" or "Auto" as the specification method for the Loop ID.
  "Loop ID" is an identification number of a node in a loop.
- Loop ID
  - Manual
    When "Set Loop ID" is "Manual", enter the Loop ID.
    The Loop ID must have a value that is different from the values of all the ports.
    The following input condition applies:
    - 0x0 - 0x7D
  - Auto
    When the "Set Loop ID" is "Auto", select "Ascending" or "Descending".
- Transfer Rate
  Select the transfer speed for the target port. The available transfer rate varies according to the selected port type and connection topology.
  - Auto-negotiation
  - 1 Gbit/s (Not supported)
  - 2 Gbit/s (Not supported when "Type" is "16G FC")
  - 4 Gbit/s
  - 8 Gbit/s
  - 16 Gbit/s (Not supported when "Type" is "8G FC" or when "Type" is "16G FC" and "Connection" is "FC-AL")

Caution

- Select "Auto-negotiation", "2 Gbit/s", "4 Gbit/s", "8 Gbit/s", or "16 Gbit/s" for "Transfer Rate". Note that "1 Gbit/s" is not supported.
- "Auto-negotiation" is selected for "Transfer Rate" when "Type" is "16G FC", "Transfer Rate" is "16 Gbit/s", and "Connection" is changed from "Fabric" to "FC-AL".

- Frame Size
  Select the frame size of the target port.
  "Frame Size" specifies the length of the communication information.
  - 512 bytes
  - 1024 bytes
  - 2048 bytes
- WWN (Port Name)
  When Storage Migration is performed, the ETERNUS DX Disk storage system (destination storage system) is regarded as a server connecting to the migration source storage system. Specify the World Wide Port Name (WWPN) for the server that was connected to the FC-CA port of the migration source storage system.
  The default "WWN (Port Name)" is displayed with parentheses on the right side of the [Default] button. Click the [Default] button to set the default value.

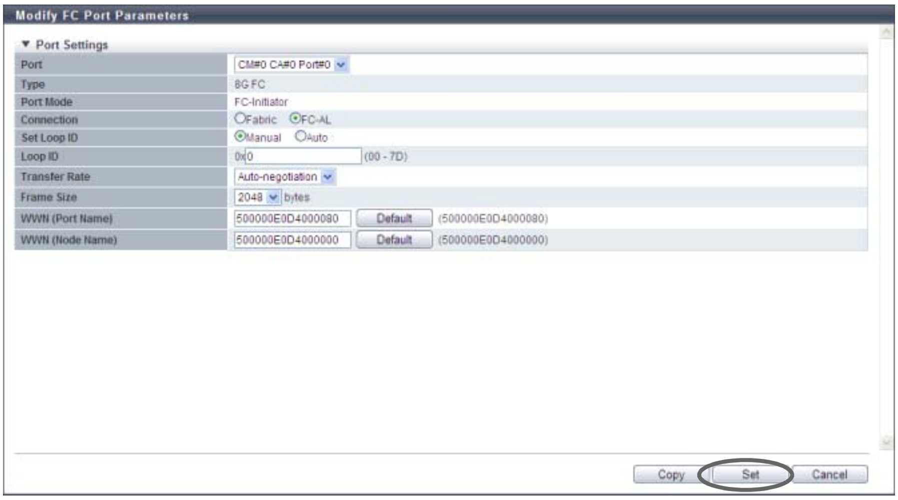
Caution

Specifying the WWPN of the server is only required when the host affinity setting is configured between the server and a migration source FC-CA port.
If LUN mapping is configured for a migration source FC-CA port, the default value does not need to be changed.

- WWN (Node Name)
  When Storage Migration is performed, the ETERNUS DX Disk storage system (destination storage system) is regarded as a server connecting to the migration source storage system. Specify the World Wide Node Name (WWNN) for the server that was connected to the FC-CA port of the migration source storage system.
  The default "WWN (Node Name)" is displayed with parentheses on the right side of the [Default] button. Click the [Default] button to set the default value.

Caution

Specifying the WWNN of the server is only required when the host affinity setting is configured between the server and a migration source FC-CA port.
If LUN mapping is configured for a migration source FC-CA port, the default value does not need to be changed.

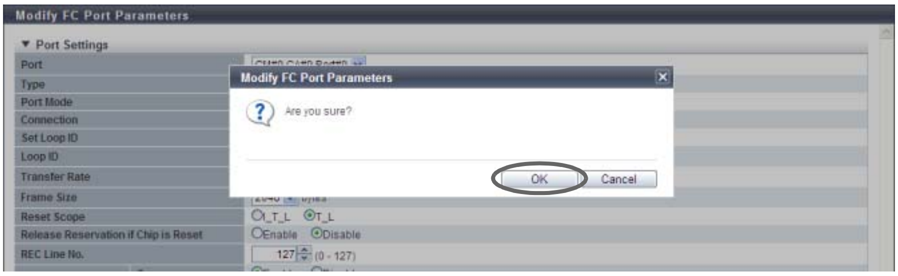


→ A confirmation screen appears.

Caution

- If the Loop ID is changed while a PRIMEPOWER server is operating, reboot the server immediately. If the parameters do not satisfy the input conditions, an error screen appears.
- If some parameters do not satisfy the input conditions, an error screen appears.

3 Click the [OK] button.



→ Modification of the FC port parameters starts.

4 Click the [Done] button to return to the [FC Port Group] screen.

End of procedure

9.2.3.8 Modify iSCSI Port Parameters

This function sets the connection information for the iSCSI ports that connect the ETERNUS DX Disk storage system and the host or local and remote ETERNUS DX Disk storage systems.

Caution

When changing port parameters during operation, stop access from the server that is allocated to the target port. Host access does not need to be stopped to change the port parameters of newly added CA ports.

Note

- There are three port modes for an iSCSI port; CA, RA, and CA/RA. CA is used for connecting to a server, RA is used for REC, and CA/RA is used for connecting to a server and for REC. To switch the port mode, refer to "9.2.3.11 Modify Port Mode" (page 571). The default value is "CA".
- iSCSI-RA is a dedicated adapter that is used for REC between the local device and the ETERNUS DX400 series, the ETERNUS DX8000 series, the ETERNUS4000, or the ETERNUS8000.
- For more details on iSCSI-CA parameter settings, refer to "User's Guide -Server Connection-" for each OS type.

The procedure to set iSCSI port parameters is as follows:

Procedure

1 Select which iSCSI port to set the parameters for (multiple selections can be made) and click [Configure iSCSI Port] in [Action].

Note

The same port mode can be selected for multiple "1G iSCSI" or "10G iSCSI" type iSCSI ports. Multiple selections can also be made for the "iSCSI-RA (for older storage system connection)" type iSCSI ports. When multiple ports are selected, select the target port and set the parameters for each port.

2 Set the parameters for all of the selected ports and click the [Set] button.

The settings of port parameters vary depending on the port type and the port mode ("When the port mode is "CA"" (page 542), "When the port mode is "RA"" (page 548), "When the port mode is "CA/RA"" (page 554), or "When the port mode is "iSCSI-RA (for older storage system connection)"" (page 562)).

■ When the port mode is "CA"

When the type is "1G iSCSI" or "10G iSCSI" and the port mode is "CA", specify the following items:

● Select Port

- Port
  Select the target port.
  The selectable port locations are displayed as options:
  - CM#x CA#y Port#z (x: CM number, y: CA number, z: Port number)

● TCP/IP Settings

- IP Version
  Select the IP version for the target port.
  - IPv4
    Specify the IPv4 address. When "IPv4" is selected, input "IP Address" (required), "Subnet Mask" (required), and "Gateway".
  - IPv6
    Specify the IPv6 address. When "IPv6" is selected, input "IPv6 Link Local Address" (required), "IPv6 Connect IP Address", and "IPv6 Gateway".
  - IPv4 / IPv6
    Specify both the IPv4 address and the IPv6 address. The input items for IPv4 and IPv6 can be specified.
- IP Address
  Input the IPv4 address of the target port (required when "IPv4" is selected).
  Click the [Test Connection (ping)] button to display the "[Send Ping Command] Screen" (page 565).
  Specify the IP address to check the connection status of the connection destination storage system and the number of transmissions. Click the [Send] button. When the "ping" command is sent, the settings of the IP address and the connection path for the destination storage system can be checked.

The following input conditions apply:

- Up to 3 numeric characters
- First text box: "1" - "255"
- Other text boxes: "0" - "255"

- Subnet Mask
  Input the subnet mask of the target port (required when "IPv4" is selected).
  The following input conditions apply:
  - Up to 3 numeric characters
  - All text boxes: "0" - "255"
- Gateway
  Input the gateway IPv4 address of the target port.
  The following input conditions apply:
  - Up to 3 numeric characters
  - All text boxes: "0" - "255"
- IPv6 Link Local Address
  Input the IPv6 link local address of the target port (required when "IPv6" is selected).
  Refer to "Available IPv6 Address" (page 757) for details. Note that the current setting is displayed by an abbreviation.
  Click the [Test Connection (ping)] button to display the "[Send Ping Command] Screen" (page 565).
  Specify the IP address to check the connection status of the connection destination storage system and the number of transmissions. Click the [Send] button. When the "ping" command is sent, the settings of the IP address and the connection path for the destination storage system can be checked.
  Click the [Default] button to set the default IPv6 link local address.
  The following input condition applies:
  - fe80::xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
    Refer to "IPv6 Address Notation" (page 378) for details.
- IPv6 Connect IP Address
  Input the IPv6 connect IP address of the target port.
  The following IPv6 addresses can be used; "global address", "unique local address", and "6to4 address". Refer to "Available IPv6 Address" (page 757) for details. Note that the current setting is displayed by an abbreviation.
  "IPv6 Connect IP Address" corresponds to "IP Address" for IPv4.
  "IPv6 Connect IP Address" can be directly input or created automatically.
  Click the [Discovery] button to display the [Select IPv6 Prefix] screen. Up to five "IPv6 Prefix" can be obtained. Select "IPv6 Prefix" to create an IPv6 connect IP address automatically from the selected IPv6 prefix and the input IPv6 link local address (interface ID). Click the [OK] button to specify the created IPv6 address in the entry field.
  Click the [Test Connection (ping)] button to display the "[Send Ping Command] Screen" (page 565).
  Specify the IP address to check the connection status of the connection destination storage system and the number of transmissions. Click the [Send] button. When the "ping" command is sent, the settings of the IP address and the connection path for the destination storage system can be checked.
  The following input condition applies:
  - xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
    Refer to "IPv6 Address Notation" (page 378) for details.

- IPv6 Gateway
  Input the gateway IPv6 address of the target port.
  The following IPv6 addresses can be used; "link local address", "global address", "unique local address", and "6to4 address". Refer to "Available IPv6 Address" (page 757) for details. Note that the current setting is displayed by an abbreviation.
  "IPv6 Gateway" can be directly input or created automatically.
  Click the [Discovery] button to display the [Select IPv6 Gateway] screen. Up to three "IPv6 Gateway" can be obtained. Select "IPv6 Gateway" and click the [OK] button. The selected IPv6 address is specified in the entry field.
  The following input condition applies:
  - xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
    Refer to "IPv6 Address Notation" (page 378) for details.
- TCP Port No.
  Input the TCP port number of the target port between 0 and 28671.
  Click the [Default] button to set the default TCP port number.
- TCP Window Scale
  Select the TCP Window scale of the target port between 0 and 14.
  "TCP Window Scale" is a parameter that is used to specify the TCP window size. When the I/O load is high, the expected performance may not be achieved even if "0" or "1" is specified for TCP Window Scale. Even if "8" or higher is specified, the ETERNUS DX Disk storage system performs as though "7" is specified for TCP Window Scale.
  Specify the "TCP Window Scale" in powers of two (when the value is n-th to the power of two, "n" indicates the "TCP Window Scale"). The relationship between the setting value and the TCP Window size is as follows:

TCP Window Scale	TCP Window size
0	32 KB
1	64 KB
2	128 KB
3	256 KB
4	512 KB
5	1024 KB
6	2048 KB
7	4096 KB
8	8192 KB
9	16384 KB
10	32768 KB
11	65536 KB
12	131072 KB
13	262144 KB
14	524288 KB

- Congestion Control Option
  Specify whether to enable or disable the use of "The New Reno Modification to TCP's Fast Recovery Algorithm" for controlling congestion in the target port. Select "Enable" when using the congestion control option. When not using the congestion control option, select "Disable". It is not necessary to change the default setting (Enable) for normal use.

Caution

When "Disable" is selected, the path may be unstable or blocked due to factors such as the path bandwidth or the switch buffer size. However, if a long transmission delay occurs, performance may be improved. Perform sufficient verification of the network environment before specifying "Disable" for the congestion control option.

- iSNS Server
  Select whether to enable the use of an iSNS server with IPv4 or IPv6, or disable the use of an iSNS server for the target port.
  When "IPv4" or "IPv6" is selected, input the IP address of the iSNS server.
  Internet Storage Name Service (iSNS) is almost equivalent to Domain Name System (DNS) for the Internet. iSNS server is used to convert the iSCSI name to the IP address on the iSCSI network.

Caution

- When "IP Version" is "IPv4" or "IPv4 / IPv6", "IPv4" and "Disable" can be selected.
- When "IP Version" is "IPv6" or "IPv4 / IPv6", "IPv6" and "Disable" can be selected.

- iSNS Server (IPv4 Address)
  When "iSNS Server" is "IPv4", input the IPv4 address for the iSNS server.
  The following input conditions apply:
  - xxx.xxx.xxx.xxx
    xxx: 1 - 255 for the top field (decimal)
    xxx: 0 - 255 for other fields (decimal)
- iSNS Server (IPv6 Address)
  When "iSNS Server" is "IPv6", input the IPv6 address for the iSNS server.
  The following IPv6 addresses can be used; "link local address", "global address", "unique local address", and "6to4 address". Refer to "Available IPv6 Address" (page 757) for details. Note that the current setting is displayed by an abbreviation.
  The following input condition applies:
  - xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
    Refer to "IPv6 Address Notation" (page 378) for details.
- iSNS Server Port No.
  When "iSNS Server" for the target port is "IPv4" or "IPv6", specify between 0 and 65535 for the port number of the iSNS server.
  Click the [Default] button to set the default iSNS server port number.

iSCSI Settings

- iSCSI Name
  Input the iSCSI name of the target port.
  Click the [Default] button to set the default iSCSI name.
  The following input conditions apply:
  - Alphabetic characters (lower case) and numeric characters
  - Symbols "-" (hyphen), "." (period) and ":" (colon)
  - The name starts with "iqn." or "eui."
  - 4 - 223 characters

Caution

The same iSCSI name cannot be set to multiple iSCSI ports except the iSCSI name of the ETERNUS DX Disk storage system.

- Alias Name
  Input the Alias Name of the target port.
  While the iSCSI name is a formal nomenclature that specifies the target iSCSI port, an Alias Name is used as nickname.
  An Alias Name that is the same as another port cannot be specified.
  The following input condition applies:
  - Up to 31 alphanumeric characters

General Settings

- Jumbo Frame
  Select whether to "Enable" or "Disable" the Jumbo Frame.
  Select "Enable" when using the Jumbo Frame to transfer data via the target port. When not using the Jumbo Frame, select "Disable".
  Enabling Jumbo Frame increases the amount of data to be transferred per Frame, making data transfer more efficient.
  Confirm that the connected device (*1) supports the Jumbo Frame before enabling the Jumbo Frame.
  *1: When the ETERNUS DX Disk storage system and server are connected directly, this indicates that the connected device is a server side LAN card (NIC). When the ETERNUS DX Disk storage system and server are connected via a switch, this indicates that the connected device is a switch.
- VLAN ID
  Select whether to "Enable" or "Disable" the VLAN ID for the target port.
  When "Enable" is selected, specify the VLAN ID between 0 and 4095.

Caution

When specifying the VLAN ID, confirm the VLAN setting values of the LAN switch and the VLAN tagging configuration of the server LAN card.

- Reset Scope
  Specify the reset scope of the target port.
  Reset scope is the range where the command reset from the server is performed, when the target port is connected to multiple servers.
  - I_T_L (I: Initiator, T: Target, L: LUN)
    Reset (cancel) the command request from the server that sent the command reset request.
  - T_L (T: Target, L: LUN)
    Reset (cancels) the command request from all of the servers that are connected to the port.
- Release Reservation if Chip is Reset
  Select whether to "Enable" or "Disable" the function to release the reserved status of the volume when the target port (chip) is reset.

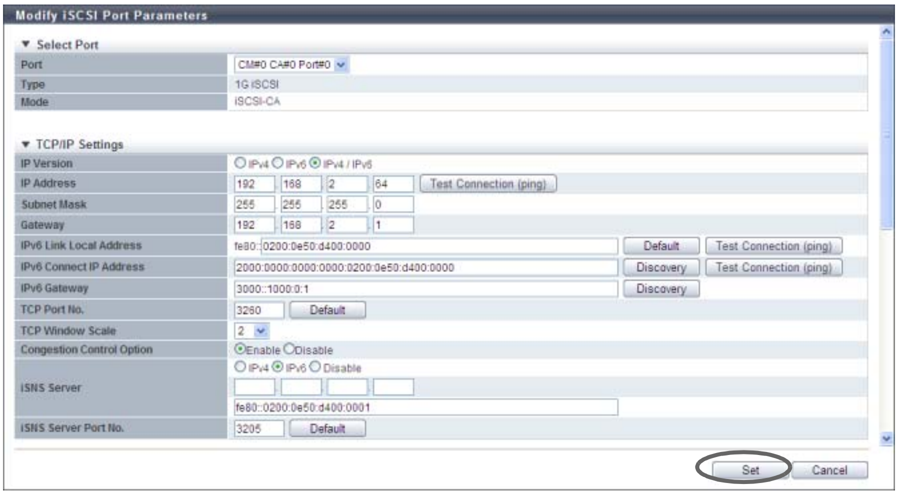
- CmdSN Count
  Change the number of commands that can be accepted from the host to the target port at the same time. It is not necessary to change the default setting (Unlimited) for normal use.
  - Unlimited
  - 180
  - 100
  - 80
  - 40
  - 20

Security

- CHAP
  Select "ON" to enable unidirectional CHAP authentication or bidirectional CHAP authentication for the target CA port. Select "OFF" to disable unidirectional CHAP authentication and bidirectional CHAP authentication.
  For CHAP authentication, an encrypted password based on a random key that the ETERNUS DX Disk storage system receives from the host is sent, and connection possibility is judged on the server side.
- CHAP User Name
  When using bidirectional CHAP authentication, enter the user name to access the target port. This setting is not required when using unidirectional CHAP authentication. Make sure to set the user name and password in pairs.
  The following input conditions applied:
  - Up to 255 alphanumeric characters and symbols
  - Space
- New Password
  When using bidirectional CHAP authentication, enter the password to access the target port. This setting is not required when using unidirectional CHAP authentication. Make sure to set the user name and password in pairs.
  The following input conditions apply:
  - 12 - 100 alphanumeric characters and symbols
  - Space
- Confirm new Password
  Specify the same password as that entered in the "New Password" field.
  The following input conditions apply:
  - 12 - 100 alphanumeric characters and symbols
  - Space
- Header Digest
  Select "OFF" to not add the Header Digest of the target port. Select "CRC32C" to add the Header Digest. Header Digest is a check code to be added to the header part of the iSCSI port detailed information.
  Specify "CRC32C" when the host requests to add the check code. "CRC32C" is the algorithm that is used to create a check code.
- Data Digest
  Select "OFF" to not add the Data Digest of the target port. Select "CRC32C" to add the Data Digest. Data Digest is a check code to be added to the data area of the iSCSI port detailed information.
  Specify "CRC32C" when the host requests to add the check code. "CRC32C" is the algorithm that is used to create a check code.

Caution

Data transmission might fail when "Header Digest" or "Data Digest" is enabled. In this case, select "OFF" for "Header Digest" and "Data Digest".



■ When the port mode is "RA"

When the type is "1G iSCSI" or "10G iSCSI" and the port mode is "RA", specify the following items:

● Select Port

- Port
  Select the target port.
  The selectable ports are displayed as options:
  - CM#x CA#y Port#z (x: CM number, y: CA number, z: Port number)

● TCP/IP Settings

- IP Version
  Select the IP version for the target port.
  - IPv4
    Specify the IPv4 address. When "IPv4" is selected, input "IP Address" (required), "Subnet Mask" (required), and "Gateway".
  - IPv6
    Specify the IPv6 address. When "IPv6" is selected, input "IPv6 Link Local Address" (required), "IPv6 Connect IP Address", and "IPv6 Gateway".
  - IPv4 / IPv6
    Specify both the IPv4 address and the IPv6 address. The input items for IPv4 and IPv6 can be specified.
- IP Address
  Input the IPv4 address of the target port (required when "IPv4" is selected).
  Click the [Test Connection (ping)] button to display the "[Send Ping Command] Screen" (page 565).
  Specify the IP address to check the connection status of the connection destination storage system and the number of transmissions. Click the [Send] button. When the "ping" command is sent, the settings of the IP address and the connection path for the destination storage system can be checked.

The following input conditions apply:
- Up to 3 numeric characters
- First text box: "1" - "255"
- Other text boxes: "0" - "255"

- Subnet Mask
  Input the subnet mask of the target port (required when "IPv4" is selected).
  The following input conditions apply:
  - Up to 3 numeric characters
  - All text boxes: "0" - "255"
- Gateway
  Input the gateway IPv4 address of the target port.
  - Up to 3 numeric characters
  - All text boxes: "0" - "255"
- IPv6 Link Local Address
  Input the IPv6 link local address of the target port (required when "IPv6" is selected).
  Refer to "Available IPv6 Address" (page 757) for details. Note that the current setting is displayed by an abbreviation.
  Click the [Test Connection (ping)] button to display the "[Send Ping Command] Screen" (page 565). Specify the IP address to check the connection status of the connection destination storage system and the number of transmissions. Click the [Send] button. When the "ping" command is sent, the settings of the IP address and the connection path for the destination storage system can be checked.
  Click the [Default] button to set the default IPv6 link local address.
  The following input condition applies:
  - fe80::xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
    Refer to "IPv6 Address Notation" (page 378) for details.
- IPv6 Connect IP Address
  Input the IPv6 connect IP address of the target port.
  The following IPv6 addresses can be used; "global address", "unique local address", and "6to4 address". Refer to "Available IPv6 Address" (page 757) for details. Note that the current setting is displayed by an abbreviation.
  "IPv6 Connect IP Address" corresponds to "IP Address" for IPv4.
  "IPv6 Connect IP Address" can be directly input or created automatically.
  Click the [Discovery] button to display the [Select IPv6 Prefix] screen. Up to five "IPv6 Prefix" can be obtained. Select "IPv6 Prefix" to create an IPv6 connect IP address automatically from the selected IPv6 prefix and the input IPv6 link local address (interface ID). Click the [OK] button to specify the created IPv6 address in the entry field.
  Click the [Test Connection (ping)] button to display the "[Send Ping Command] Screen" (page 565). Specify the IP address to check the connection status of the connection destination storage system and the number of transmissions. Click the [Send] button. When the "ping" command is sent, the settings of the IP address and the connection path for the destination storage system can be checked.
  The following input condition applies:
  - xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
    Refer to "IPv6 Address Notation" (page 378) for details.

- IPv6 Gateway
  Input the gateway IPv6 address of the target port.
  The following IPv6 addresses can be used; "link local address", "global address", "unique local address", and "6to4 address". Refer to "Available IPv6 Address" (page 757) for details. Note that the current setting is displayed by an abbreviation.
  "IPv6 Gateway" can be directly input or created automatically.
  Click the [Discovery] button to display the [Select IPv6 Gateway] screen. Up to three "IPv6 Gateway" can be obtained. Select "IPv6 Gateway" and click the [OK] button. The selected IPv6 address is specified in the entry field.
  The following input condition applies:
  - xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
    Refer to "IPv6 Address Notation" (page 378) for details.
- TCP Port No.
  Input the TCP port number of the target port between 0 and 28671.
  Click the [Default] button to set the default TCP port number.

Caution

Do not change the TCP port number from 3260 (default value). REC can only be performed when "TCP Port No." is "3260".

- TCP Window Scale
  Select the TCP Window scale of the target port between 0 and 14.
  "TCP Window Scale" is a parameter that is used to specify the TCP window size. When the I/O load is high, the expected performance may not be achieved even if "0" or "1" is specified for TCP Window Scale. Even if "8" or higher is specified, the ETERNUS DX Disk storage system performs as though "7" is specified for TCP Window Scale.
  Specify the "TCP Window Scale" in powers of two (when the value is n-th to the power of two, "n" indicates the "TCP Window Scale"). The relationship between the setting value and the TCP Window size is as follows:

TCP Window Scale	TCP Window size
0	32 KB
1	64 KB
2	128 KB
3	256 KB
4	512 KB
5	1024 KB
6	2048 KB
7	4096 KB
8	8192 KB
9	16384 KB
10	32768 KB
11	65536 KB
12	131072 KB
13	262144 KB
14	524288 KB

- Congestion Control Option
Specify whether to enable or disable the use of "The New Reno Modification to TCP's Fast Recovery Algorithm" for controlling congestion in the target port. Select "Enable" when using the congestion control option. When not using the congestion control option, select "Disable". It is not necessary to change the default setting (Enable) for normal use.

Caution

When "Disable" is selected, the path may be unstable or blocked due to factors such as the path bandwidth or the switch buffer size. However, if a long transmission delay occurs, performance may be improved. Perform sufficient verification of the network environment before specifying "Disable" for the congestion control option.

iSCSI Settings

- iSCSI Name
Input the iSCSI name of the target port.
Click the [Default] button to set the default iSCSI name.
The following input conditions apply:
  - Alphabetic characters (lower case) and numeric characters
  - Symbols "-" (hyphen), "." (period) and ":" (colon)
  - The name starts with "iqn." or "eui."
  - 4 - 223 characters

Caution

The same iSCSI name cannot be set to multiple iSCSI ports except the iSCSI name of the ETERNUS DX Disk storage system.

- Alias Name
Input the Alias Name of the target port.
While the iSCSI name is a formal nomenclature that specifies the target iSCSI port, an Alias Name is used as nickname.
An Alias Name that is the same as another port cannot be specified.
The following input condition applies:
  - Up to 31 alphanumeric characters

General Settings

- VLAN ID
Select whether to "Enable" or "Disable" the VLAN ID for the target port.
When "Enable" is selected, specify the VLAN ID between 0 and 4095.
- MTU
Specify the MTU size of the target port.
"Maximum Transmission Unit (MTU)" is the maximum amount of data that can be transmitted at the one time over the communication network.
The following input conditions apply:
  - When "IP Version" is "IPv4": 576 - 9000 bytes
  - When "IP Version" is "IPv6" or "IPv4 / IPv6": 1280 - 9000 bytes

Security

- CHAP
  Select "ON "to enable CHAP authentication for the target port. Select "OFF" to disable CHAP authentication.
  For CHAP authentication, an encrypted password based on a random key that the ETERNUS DX Disk storage system receives from the host is sent, and connection possibility is judged on the server side.
- CHAP User Name
  When "ON" is selected for "CHAP", enter the user name to access the target port. Make sure to set the user name and password in pairs.
  The following input conditions apply:
  - Up to 63 alphanumeric characters and symbols
  - Space
- New Password
  When "ON" is selected for "CHAP", enter the password to access the target port. Make sure to set the user name and password in pairs.
  The following input conditions apply:
  - 12 - 32 alphanumeric characters and symbols
  - Space
- Confirm new Password
  Specify the same password as that entered in the "New Password" field.
  The following input conditions apply:
  - 12 - 32 alphanumeric characters and symbols
  - Space

REC Settings

- REC Line No.
  Select the REC line number of the target port.
  The REC line number is used to switch the communication path when a line fails. The REC line number is used to recognize failed lines. Set different REC line numbers for each physical communication path. When lines are in normal status, an REC can be performed regardless of the REC line number (specifying the same REC line numbers is allowed) in the same way as conventional REC operations. Note that no priority applies to REC line numbers.

  Caution

  - When a line fails, the communication path is switched according to the REC line number of the copy source storage system. For normal operation, set the same REC line number for the copy source and the copy destination storage systems to recover data.
  - If the port mode has been changed from "RA" to "CA", the REC line number returns to the default setting ("0"). When the port mode has changed from "RA" to "CA/RA", the current REC line number setting is retained. Refer to "9.2.3.11 Modify Port Mode" (page 571) for details.

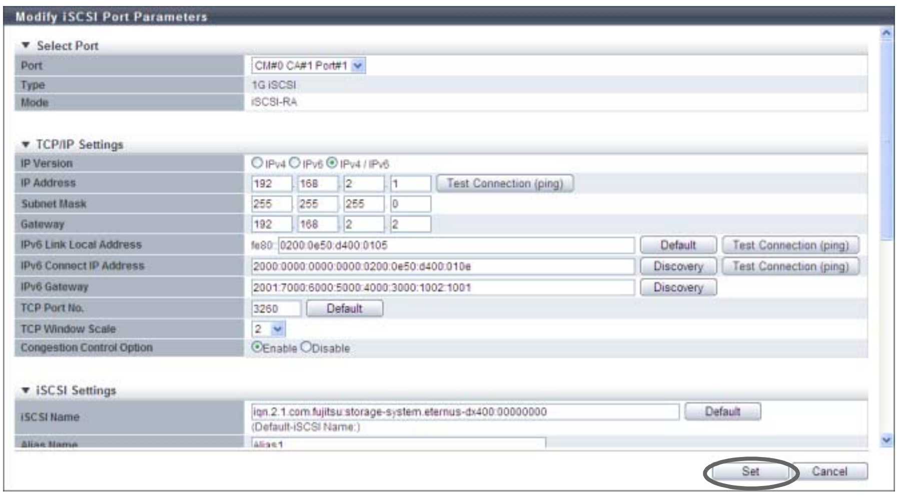
- REC Transfer Mode
  Select which REC transfer mode is enabled or disabled for the target port.
  When "Enable" is selected, an REC is performed in the selected transfer mode for the target port.
  When "Disable" is selected, an REC is not performed in the selected transfer mode for the target port.

To set the REC transfer mode for the specific port, enable the appropriate mode. For example, specify different ports for Consistency and Stack to perform data transfers without any interference. The current setting is retained even when an REC path is changed. When "Enable" is selected for all of the REC transfer modes (default setting), a conventional REC is performed.

- Sync (REC in synchronous transfer mode)
- Async Stack (REC in asynchronous stack mode)
- Async Consistency (REC in asynchronous consistency mode)
- Async Through (REC in asynchronous through mode)

Caution

- The REC transfer mode can be changed without suspending a copy session even when an REC is being performed in the target port. The changed settings are applied immediately to the ETERNUS DX Disk storage system.
- If specific REC transfer modes for all the RA ports and the CA/RA ports are disabled, a copy session with a disabled REC transfer mode fails because the REC paths for all the RA ports and the CA/RA ports are regarded as being blocked. When the REC transfer mode for a copy session that is being performed is disabled, this copy session is halted.
- When "Async Consistency" is disabled for all the RA ports and the CA/RA ports, the REC buffer status changes to "INACTIVE".
- For normal operations, set the same REC transfer mode for the copy source and the copy destination storage systems to recover data. When the REC transfer mode is specified for a copy source storage system, the specified REC transfer mode is performed even if the controller firmware version of the copy destination storage system is V10L49 or earlier.
- If the port mode has changed from "RA" to "CA", the REC transfer mode returns to the default setting ("Enable"). When the port mode has changed from "RA" to "CA/RA", the current REC transfer mode setting is retained. Refer to "9.2.3.11 Modify Port Mode" (page 571) for details.



When the port mode is "CA/RA"

When the type is "1G iSCSI" or "10G iSCSI" and the port mode is "CA/RA", specify the following items:

Select Port

- Port
  Select the target port.
  The selectable port locations are displayed as options:
  - CM#x CA#y Port#z (x: CM number, y: CA number, z: Port number)

TCP/IP Settings

- IP Version
  Select the IP version for the target port.
  - IPv4
    Specify the IPv4 address. When "IPv4" is selected, input "IP Address" (required), "Subnet Mask" (required), and "Gateway".
  - IPv6
    Specify the IPv6 address. When "IPv6" is selected, input "IPv6 Link Local Address" (required), "IPv6 Connect IP Address", and "IPv6 Gateway".
  - IPv4 / IPv6
    Specify both the IPv4 address and the IPv6 address. The input items for IPv4 and IPv6 can be specified.
- IP Address
  Input the IPv4 address of the target port (required when "IPv4" is selected).
  Click the [Test Connection (ping)] button to display the "[Send Ping Command] Screen" (page 565). Specify the IP address to check the connection status of the connection destination storage system and the number of transmissions. Click the [Send] button. When the "ping" command is sent, the settings of the IP address and the connection path for the destination storage system can be checked.
  The following input conditions apply:
  - Up to 3 numeric characters
  - First text box: "1" - "255"
  - Other text boxes: "0" - "255"
- Subnet Mask
  Input the subnet mask of the target port (required when "IPv4" is selected).
  The following input conditions apply:
  - Up to 3 numeric characters
  - All text boxes: "0" - "255"
- Gateway
  Input the gateway IPv4 address of the target port.
  - Up to 3 numeric characters
  - All text boxes: "0" - "255"

- IPv6 Link Local Address
  Input the IPv6 link local address of the target port (required when "IPv6" is selected).
  Refer to "Available IPv6 Address" (page 757) for details. Note that the current setting is displayed by an abbreviation.
  Click the [Test Connection (ping)] button to display the "[Send Ping Command] Screen" (page 565). Specify the IP address to check the connection status of the connection destination storage system and the number of transmissions. Click the [Send] button. When the "ping" command is sent, the settings of the IP address and the connection path for the destination storage system can be checked.
  Click the [Default] button to set the default IPv6 link local address.
  The following input condition applies:
  - fe80::xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
    Refer to "IPv6 Address Notation" (page 378) for details.
- IPv6 Connect IP Address
  Input the IPv6 connect IP address of the target port.
  The following IPv6 addresses can be used; "global address", "unique local address", and "6to4 address". Refer to "Available IPv6 Address" (page 757) for details. Note that the current setting is displayed by an abbreviation.
  "IPv6 Connect IP Address" corresponds to "IP Address" for IPv4.
  "IPv6 Connect IP Address" can be directly input or created automatically.
  Click the [Discovery] button to display the [Select IPv6 Prefix] screen. Up to five "IPv6 Prefix" can be obtained. Select "IPv6 Prefix" to create an IPv6 connect IP address automatically from the selected IPv6 prefix and the input IPv6 link local address (interface ID). Click the [OK] button to specify the created IPv6 address in the entry field.
  Click the [Test Connection (ping)] button to display the "[Send Ping Command] Screen" (page 565). Specify the IP address to check the connection status of the connection destination storage system and the number of transmissions. Click the [Send] button. When the "ping" command is sent, the settings of the IP address and the connection path for the destination storage system can be checked.
  The following input condition applies:
  - xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
    Refer to "IPv6 Address Notation" (page 378) for details.
- IPv6 Gateway
  Input the gateway IPv6 address of the target port.
  The following IPv6 addresses can be used; "link local address", "global address", "unique local address", and "6to4 address". Refer to "Available IPv6 Address" (page 757) for details. Note that the current setting is displayed by an abbreviation.
  "IPv6 Gateway" can be directly input or created automatically.
  Click the [Discovery] button to display the [Select IPv6 Gateway] screen. Up to three "IPv6 Gateway" can be obtained. Select "IPv6 Gateway" and click the [OK] button. The selected IPv6 address is specified in the entry field.
  The following input condition applies:
  - xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
    Refer to "IPv6 Address Notation" (page 378) for details.
- TCP Port No.
  Input the TCP port number of the target port between 0 and 28671.
  Click the [Default] button to set the default TCP port number.

Caution

Do not change the TCP port number from 3260 (default value). REC can only be performed when "TCP Port No." is "3260".

- TCP Window Scale
  Select the TCP Window scale of the target port between 0 and 14.
  "TCP Window Scale" is a parameter that is used to specify the TCP window size. When the I/O load is high, the expected performance may not be achieved even if "0" or "1" is specified for TCP Window Scale. Even if "8" or higher is specified, the ETERNUS DX Disk storage system performs as though "7" is specified for TCP Window Scale.
  Specify the "TCP Window Scale" in powers of two (when the value is n-th to the power of two, "n" indicates the "TCP Window Scale"). The relationship between the setting value and the TCP Window size is as follows:

TCP Window Scale	TCP Window size
0	32 KB
1	64 KB
2	128 KB
3	256 KB
4	512 KB
5	1024 KB
6	2048 KB
7	4096 KB
8	8192 KB
9	16384 KB
10	32768 KB
11	65536 KB
12	131072 KB
13	262144 KB
14	524288 KB

- Congestion Control Option
  Specify whether to enable or disable the use of "The New Reno Modification to TCP's Fast Recovery Algorithm" for controlling congestion in the target port. Select "Enable" when using the congestion control option. When not using the congestion control option, select "Disable". It is not necessary to change the default setting (Enable) for normal use.

Caution

When "Disable" is selected, the path may be unstable or blocked due to factors such as the path bandwidth or the switch buffer size. However, if a long transmission delay occurs, performance may be improved. Perform sufficient verification of the network environment before specifying "Disable" for the congestion control option.

- iSNS Server
  Select whether to enable the use of an iSNS server with IPv4 or IPv6, or disable the use of an iSNS server for the target port.
  When "IPv4" or "IPv6" is selected, input the IP address of the iSNS server.
  Internet Storage Name Service (iSNS) is almost equivalent to Domain Name System (DNS) for the Internet. iSNS server is used to convert the iSCSI name to the IP address on the iSCSI network.

Caution

- When "IP Version" is "IPv4" or "IPv4 / IPv6", "IPv4" and "Disable" can be selected.
- When "IP Version" is "IPv6" or "IPv4 / IPv6", "IPv6" and "Disable" can be selected.

- iSNS Server (IPv4 Address)
  When "iSNS Server" is "IPv4", input the IPv4 address for the iSNS server.
  The following input condition applies:
  - xxx.xxx.xxx.xxx
    xxx: 1 - 255 for the top field (decimal)
    xxx: 0 - 255 for other fields (decimal)
- iSNS Server (IPv6 Address)
  When "iSNS Server" is "IPv6", input the IPv6 address for the iSNS server.
  The following input condition applies:
  - xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
    Refer to "IPv6 Address Notation" (page 378) for details.
- iSNS Server Port No.
  When "iSNS Server" for the target port is "IPv4" or "IPv6", specify between 0 and 65535 for the port number of the iSNS server.
  Click the [Default] button to set the default iSNS server port number.

iSCSI Settings

- iSCSI Name
  Input the iSCSI name of the target port.
  Click the [Default] button to set the default iSCSI name.
  The following input conditions apply:
  - Alphabetic characters (lower case) and numeric characters
  - Symbols "-" (hyphen), "." (period) and ":" (colon)
  - The name starts with "iqn." or "eui."
  - 4 - 223 characters

Caution

The same iSCSI name cannot be set to multiple iSCSI ports except the iSCSI name of the ETERNUS DX Disk storage system.

- Alias Name
  Input the Alias Name of the target port.
  While the iSCSI name is a formal nomenclature that specifies the target iSCSI port, an Alias Name is used as nickname.
  An Alias Name that is the same as another port cannot be specified.
  The following input condition applies:
  - Up to 31 alphanumeric characters

General Settings

- VLAN ID
  Select whether to "Enable" or "Disable" the VLAN ID for the target port.
  When "Enable" is selected, specify the VLAN ID between 0 and 4095.

Caution

When specifying the VLAN ID, confirm the VLAN setting values of the LAN switch and the VLAN tagging configuration of the server LAN card.

- Reset Scope
  Specify the reset scope of the target port.
  Reset scope is the range where the command reset from the server is performed, when the target port is connected to multiple servers.
  - I_T_L (I: Initiator, T: Target, L: LUN)
    Reset (cancel) the command request from the server that sent the command reset request.
  - T_L (T: Target, L: LUN)
    Reset (cancels) the command request from all of the servers that are connected to the port.
- Release Reservation if Chip is Reset
  Select whether to "Enable" or "Disable" the function to release the reserved status of the volume when the target port (chip) is reset.
- CmdSN Count
  Change the number of commands that can be accepted from the host to the target port at the same time. It is not necessary to change the default setting (Unlimited) for normal use.
  - Unlimited
  - 180
  - 100
  - 80
  - 40
  - 20
- MTU
  Specify the MTU size of the target port.
  "Maximum Transmission Unit (MTU)" is the maximum amount of data that can be transmitted at the one time over the communication network.
  The following input conditions apply:
  - When "IP Version" is "IPv4": 576 - 9000 bytes
  - When "IP Version" is "IPv6" or "IPv4 / IPv6": 1280 - 9000 bytes

Security

- CHAP (CA)
  Select "ON" to enable unidirectional CHAP authentication or bidirectional CHAP authentication for the target CA port. Select "OFF" to disable unidirectional CHAP authentication and bidirectional CHAP authentication.
  For CHAP authentication, an encrypted password based on a random key that the ETERNUS DX Disk storage system receives from the host is sent, and connection possibility is judged on the server side.
- CHAP User Name (CA)
  When using bidirectional CHAP authentication, enter the user name to access the target CA port. This setting is not required when using unidirectional CHAP authentication. Make sure to set the user name and password in pairs.
  The following input conditions applied:
  - Up to 255 alphanumeric characters and symbols
  - Space
- New Password (CA)
  When using bidirectional CHAP authentication, enter the password to access the target CA port. This setting is not required when using unidirectional CHAP authentication. Make sure to set the user name and password in pairs.
  The following input conditions apply:
  - 12 - 100 alphanumeric characters and symbols
  - Space
- Confirm new Password (CA)
  Specify the same password as that entered in the "New Password (CA)" field.
  The following input conditions apply:
  - 12 - 100 alphanumeric characters and symbols
  - Space
- CHAP (RA)
  Select "ON "to enable CHAP Authentication for the target RA port. Select "OFF" to disable CHAP Authentication.
  For CHAP authentication, an encrypted password based on a random key that the ETERNUS DX Disk storage system receives from the host is sent, and connection possibility is judged on the server side.
- CHAP User Name (RA)
  When "ON" is selected for "CHAP (RA)", enter the user name to access the target RA port. Make sure to set the user name and password in pairs.
  The following input conditions apply:
  - Up to 63 alphanumeric characters and symbols
  - Space
- New Password (RA)
  When "ON" is selected for "CHAP (RA)", enter the password to access the target RA port. Make sure to set the user name and password in pairs.
  The following input conditions apply:
  - 12 - 32 alphanumeric characters and symbols
  - Space

- Confirm new Password (RA)
  Specify the same password as that entered in the "New Password (RA)" field.
  The following input conditions apply:
  - 12 - 32 alphanumeric characters and symbols
  - Space
- Header Digest
  Select "OFF" to not add the Header Digest of the target port. Select "CRC32C" to add the Header Digest. Header Digest is a check code to be added to the header part of the iSCSI port detailed information.
  Specify "CRC32C" when the host requests to add the check code. "CRC32C" is the algorithm that is used to create a check code.
- Data Digest
  Select "OFF" to not add the Data Digest of the target port. Select "CRC32C" to add the Data Digest. Data Digest is a check code to be added to the data area of the iSCSI port detailed information.
  Specify "CRC32C" when the host requests to add the check code. "CRC32C" is the algorithm that is used to create a check code.

Caution

Data transmission might fail when "Header Digest" or "Data Digest" is enabled. In this case, select "OFF" for "Header Digest" and "Data Digest".

REC Settings

- REC Line No.
  Select the REC line number of the target port.
  The REC line number is used to switch the communication path when a line fails. The REC line number is used to recognize failed lines. Set different REC line numbers for each physical communication path. When lines are in normal status, an REC can be performed regardless of the REC line number (specifying the same REC line numbers is allowed) in the same way as conventional REC operations. Note that no priority applies to REC line numbers.

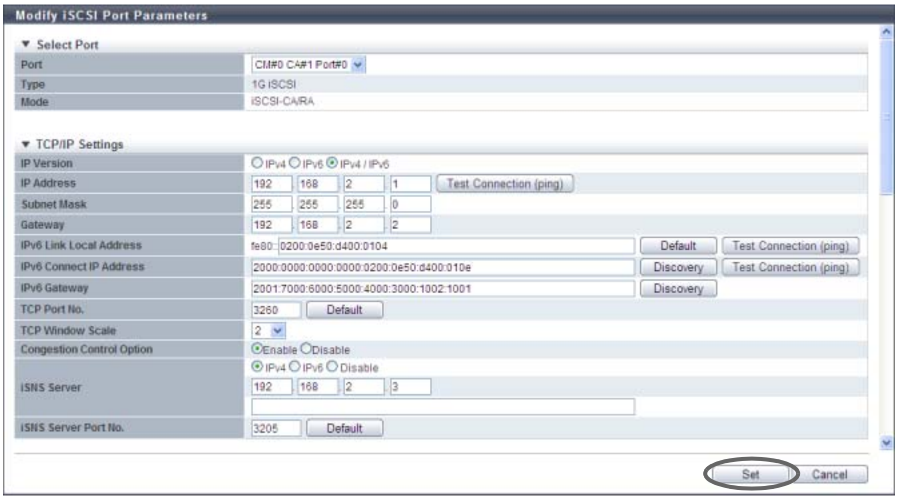
  Caution

  - When a line fails, the communication path is switched according to the REC line number of the copy source storage system. For normal operation, set the same REC line number for the copy source and the copy destination storage systems to recover data.
  - If the port mode has been changed from "CA/RA" to "CA", the REC line number returns to the default setting ("0"). When the port mode has changed from "CA/RA" to "RA", the current REC line number setting is retained. Refer to "9.2.3.11 Modify Port Mode" (page 571) for details.

- REC Transfer Mode
  Select which REC transfer mode is enabled or disabled for the target port.
  When "Enable" is selected, an REC is performed in the selected transfer mode for the target port.
  When "Disable" is selected, an REC is not performed in the selected transfer mode for the target port.
  To set the REC transfer mode for the specific port, enable the appropriate mode. For example, specify different ports for Consistency and Stack to perform data transfers without any interference.
  The current setting is retained even when an REC path is changed. When "Enable" is selected for all of the REC transfer modes (default setting), a conventional REC is performed.
  - Sync (REC in synchronous transfer mode)
  - Async Stack (REC in asynchronous stack mode)
  - Async Consistency (REC in asynchronous consistency mode)
  - Async Through (REC in asynchronous through mode)

Caution

- The REC transfer mode can be changed without suspending a copy session even when an REC is being performed in the target port. The changed settings are applied immediately to the ETERNUS DX Disk storage system.
- If specific REC transfer modes for all the RA ports and the CA/RA ports are disabled, a copy session with a disabled REC transfer mode fails because the REC paths for all the RA ports and the CA/RA ports are regarded as being blocked. When the REC transfer mode for a copy session that is being performed is disabled, this copy session is halted.
- When "Async Consistency" is disabled for all the RA ports and the CA/RA ports, the REC buffer status changes to "INACTIVE".
- For normal operations, set the same REC transfer mode for the copy source and the copy destination storage systems to recover data. When the REC transfer mode is specified for a copy source storage system, the specified REC transfer mode is performed even if the controller firmware version of the copy destination storage system is V10L49 or earlier.
- If the port mode has changed from "CA/RA" to "CA", the REC transfer mode returns to the default setting ("Enable"). When the port mode has changed from "CA/RA" to "RA", the current REC transfer mode setting is retained. Refer to "9.2.3.11 Modify Port Mode" (page 571) for details.



■ When the port mode is "iSCSI-RA (for older storage system connection)"

When the type is "iSCSI-RA (for older storage system connection)", specify the following items:

Port Settings

- Port
  Select the target port.
  The selectable port locations are displayed as options:
  - CM#x CA#y Port#z (x: CM number, y: CA number, z: Port number)

TCP/IP Settings

- IP Address
  Input the IP address of the target port (required).
  Click the [Test Connection (ping)] button to display the "[Send Ping Command] Screen" (page 565).
  Specify the IP address to check the connection status of the connection destination storage system and the number of transmissions. Click the [Send] button. When the "ping" command is sent, the settings of the IP address and the connection path for the destination storage system can be checked.
  The following input conditions apply:
  - Up to 3 numeric characters
  - First text box: "1" - "255"
  - Other text boxes: "0" - "255"
- Subnet Mask
  Input the subnet mask of the target port (required).
  The following input conditions apply:
  - Up to 3 numeric characters
  - All text boxes: "0" - "255"
- Gateway
  Input the gateway IP address of the target port.
  - Up to 3 numeric characters
  - All text boxes: "0" - "255"

Caution

Older storage systems do not support IPv6. Make sure to specify IPv4 addresses.

iSCSI Settings

- Alias Name
  Input the Alias Name of the target port.
  While the iSCSI name is a formal nomenclature that specifies the target iSCSI port, an Alias Name is used as nickname.
  An Alias Name that is the same as another port cannot be specified.
  The following input condition applies:
  - Up to 31 alphanumeric characters

General Settings

- Transfer Rate
  Select the transfer speed of the target port from the following:
  - Auto-negotiation
    "100Mbit/s (Full Duplex)" or "1Gbit/s (Full Duplex)" is automatically selected for the transfer rate.
  - 100Mbit/s
    100Mbit/s (Full Duplex)
  - 1Gbit/s
    1Gbit/s (Full Duplex)
- MTU
  Specify the MTU size of the target port.
  "Maximum Transmission Unit (MTU)" is the maximum amount of data that can be transmitted at the one time over the communication network.
  - 1000bytes
  - 1050bytes
  - 1100bytes
  - 1150bytes
  - 1200bytes
  - 1250bytes
  - 1300bytes
  - 1350bytes
  - 1400bytes
  - 1438bytes
- Limit Band Width
  Input the bandwidth limit of the target port between 10 and 400Mbit/s.
  "Bandwidth limit" is used to limit the amount of data that is transferred via an iSCSI-RA port.

Security

- CHAP
  Select "ON "to enable CHAP Authentication for the target port. Select "OFF" to disable CHAP Authentication.
  For CHAP authentication, an encrypted password based on a random key that the ETERNUS DX Disk storage system receives from the host is sent, and connection possibility is judged on the server side.
- CHAP User Name
  When "ON" is selected for "CHAP", enter the user name to access the target port. Make sure to set the user name and password in pairs.
  The following input conditions apply:
  - Up to 63 alphanumeric characters and symbols
  - Space
- New Password
  When "ON" is selected for "CHAP", enter the password to access the target port. Make sure to set the user name and password in pairs.
  The following input conditions apply:
  - 12 - 32 alphanumeric characters and symbols
  - Space

- Confirm new Password
  Specify the same password as that entered in the "New Password" field.
  The following input conditions apply:
  - 12 - 32 alphanumeric characters and symbols
  - Space

● REC Settings

- REC Line No.
  Select the REC line number of the target port.
  The REC line number is used to switch the communication path when a line fails. The REC line number is used to recognize failed lines. Set different REC line numbers for each physical communication path. When lines are in normal status, an REC can be performed regardless of the REC line number (specifying the same REC line numbers is allowed) in the same way as conventional REC operations. Note that no priority applies to REC line numbers.

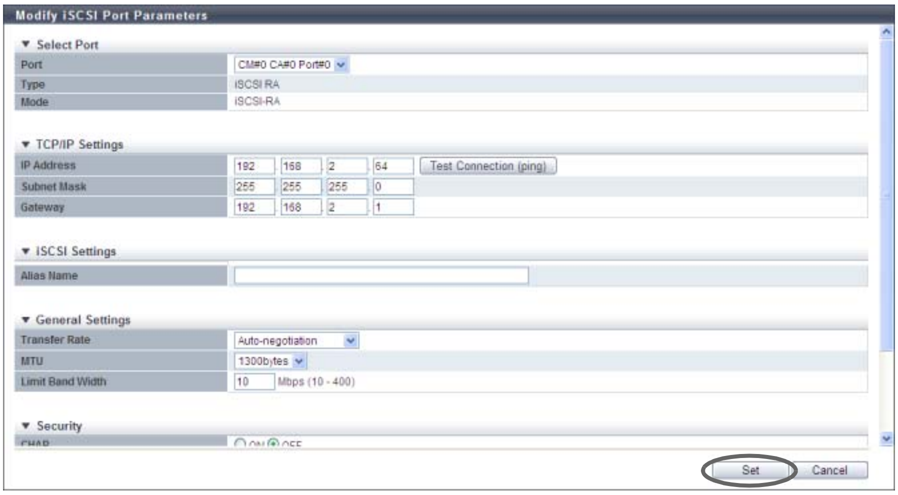
Caution

When a line fails, the communication path is switched according to the REC line number of the copy source storage system.

- REC Transfer Mode
  Select which REC transfer mode is enabled or disabled for the target port.
  When "Enable" is selected, an REC is performed in the selected transfer mode for the target port.
  When "Disable" is selected, an REC is not performed in the selected transfer mode for the target port.
  To set the REC transfer mode for the specific port, enable the appropriate mode. For example, specify different ports for Consistency and Stack to perform data transfers without any interference.
  The current setting is retained even when an REC path is changed. When "Enable" is selected for all of the REC transfer modes (default setting), a conventional REC is performed.
  - Sync (REC in synchronous transfer mode)
  - Async Stack (REC in asynchronous stack mode)
  - Async Consistency (REC in asynchronous consistency mode)
  - Async Through (REC in asynchronous through mode)

Caution

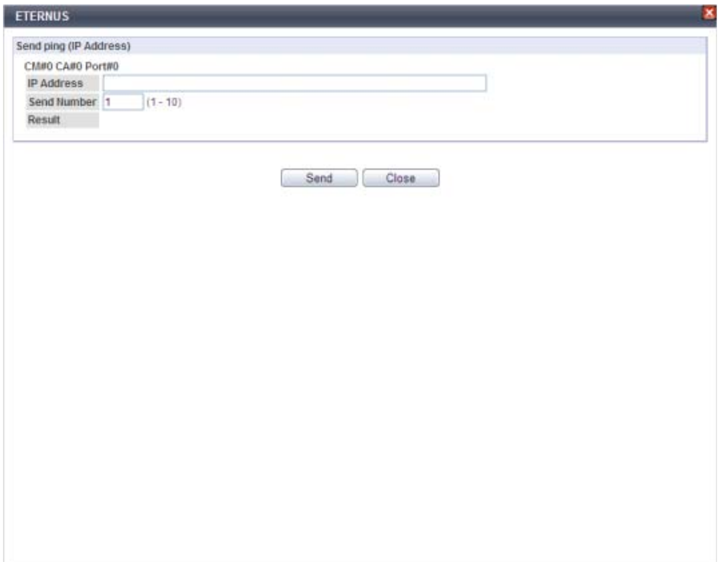
- The REC transfer mode can be changed without suspending a copy session even when an REC is being performed in the target port. The changed settings are applied immediately to the ETERNUS DX Disk storage system.
- If specific REC transfer modes for all the RA ports and the CA/RA ports are disabled, a copy session with a disabled REC transfer mode fails because the REC paths for all the RA ports and the CA/RA ports are regarded as being blocked. When the REC transfer mode for a copy session that is being performed is disabled, this copy session is halted.
- When "Async Consistency" is disabled for all the RA ports and the CA/RA ports, the REC buffer status changes to "INACTIVE".
- The specified REC transfer mode is performed only when the target port is a copy source.



■ [Send Ping Command] Screen

Checks the connection status between the target port and the destination storage system.

- IP Address
  Input the IPv4 or IPv6 address of the storage system that is used to check the connection status of the target port.
  The following IPv6 addresses can be used; "link local address", "global address", "unique local address", and "6to4 address". Refer to "Available IPv6 Address" (page 757) for details. When the current setting is displayed, the IPv6 address is displayed as an abbreviation.
  The following input conditions apply:
  - For IPv4 address
    - xxx.xxx.xxx.xxx
      xxx: 1 - 255 for the top field (decimal)
      xxx: 0 - 255 for other fields (decimal)
    - Class must be A, B, or C.
  - For IPv6 address
    xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
    Refer to "IPv6 Address Notation" (page 378) for details.
- Send Number
  Input the transmission count of the ping command between 1 and 10.
- Result
  Click the [Send] button to display the results of the ping commands that are sent.
  - success
    All were sent successfully.
  - failed
    At least one failure occurred.



→ A confirmation screen appears.

Caution

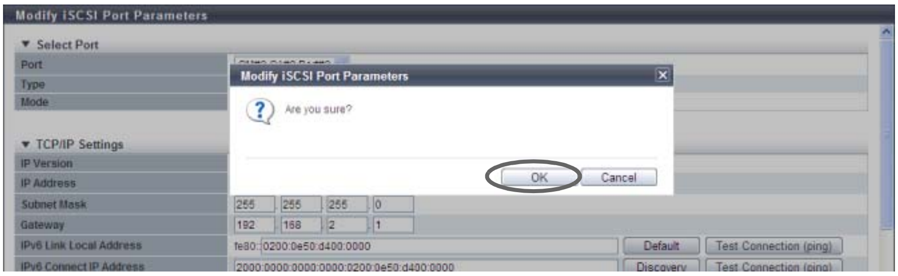
An error screen appears in the following conditions:

- When "IP Address" and "Subnet Mask" for IPv4 are not specified
- When "IPv6 Link Local Address" for IPv6 is not specified
- When there are parameters that do not satisfy the input conditions
- When "255.255.255.255" is input for the IP address, the subnet mask, or the gateway
- When the IP address and the network address are the same
- When the IP address and the broadcast address are the same
- When the gateway is set and the IP address and the gateway are the same
- When the gateway is set and the IP Address and the gateway are not in the same subnet

Note

- When the [Discovery] button is clicked for "IPv6 Connect IP Address", the IPv6 connect IP address can be created automatically from the prefix value that is obtained from the router that is connected to the ETERNUS DX Disk storage system and the input IPv6 link local address.
- When the [Discovery] button is clicked for "IPv6 Gateway", the gateway information can be obtained from the connected router.
- To check whether the IP address is allocated correctly and the connection status for the destination storage system, click the [Test Connection (ping)] button for "IP Address", "IPv6 Link Local Address", or "IPv6 Connect IP Address".

3 Click the [OK] button.



→ Modification of the iSCSI port parameters starts.

4 Click the [Done] button to return to the [iSCSI Port Group] screen.

End of procedure

9.2.3.9 Modify SAS Port Parameters

This function sets the connection information for the SAS port that is used to connect the ETERNUS DX Disk storage system and the host.

Caution

When changing port parameters during operation, stop access from the server that is allocated to the target port. Host access does not need to be stopped to change the port parameters of newly added CA ports.

Note

For more details on SAS parameter settings, refer to "User's Guide -Server Connection-" for each OS type.

The procedure to set SAS port parameters is as follows:

Procedure

1 Select the SAS port to set the parameters for (multiple selections can be made) and click [Configure SAS Port] in [Action].

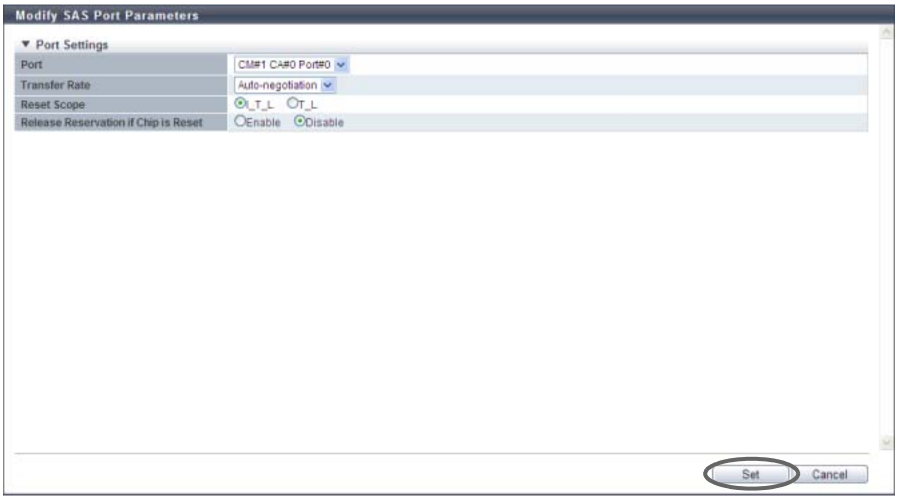
Note

When multiple ports are selected, select the target port and set the parameters for each port.

2 Set the parameters for all of the selected ports and click the [Set] button.

- Port
  Select the target port.
  The selectable port location options are displayed as options:
  - CM#x CA#y Port#z (x: CM number, y: CA number, z: Port number)

- Transfer Rate
  Select the transfer speed for the target port.
  - Auto-negotiation
  - 1.5 Gbit/s
  - 3 Gbit/s
  - 6 Gbit/s
- Reset Scope
  Specify the reset scope of the target port.
  Reset scope is the range where the command reset from the server is performed, when the target port is connected to multiple servers.
  - I_T_L (I: Initiator, T: Target, L: LUN)
    Reset (cancel) the command request from the server that sent the command reset request.
  - T_L (T: Target, L: LUN)
    Reset (cancels) the command request from all of the servers that are connected to the port.
- Release Reservation if Chip is Reset
  Select whether to "Enable" or "Disable" the function to release the reserved status of the volume when the target port (chip) is reset.



→ A confirmation screen appears.

3 Click the [OK] button.



→ Modification of the SAS port parameters starts.

4 Click the [Done] button to return to the [SAS Port Group] screen.

End of procedure

9.2.3.10 Modify FCoE Port Parameters

This function sets the connection information for the FCoE ports that connect the ETERNUS DX Disk storage system and the host.

Caution

When changing port parameters during operation, stop access from the server that is allocated to the target port. Host access does not need to be stopped to change the port parameters of newly added CA ports.

Note

For more details on FCoE parameter settings, refer to "User's Guide -Server Connection-" for each OS type.

The procedure to set FCoE port parameters is as follows:

Procedure

1 Select the FCoE port to set the parameters for (multiple selections can be made) and click [Configure FCoE Port] in [Action].

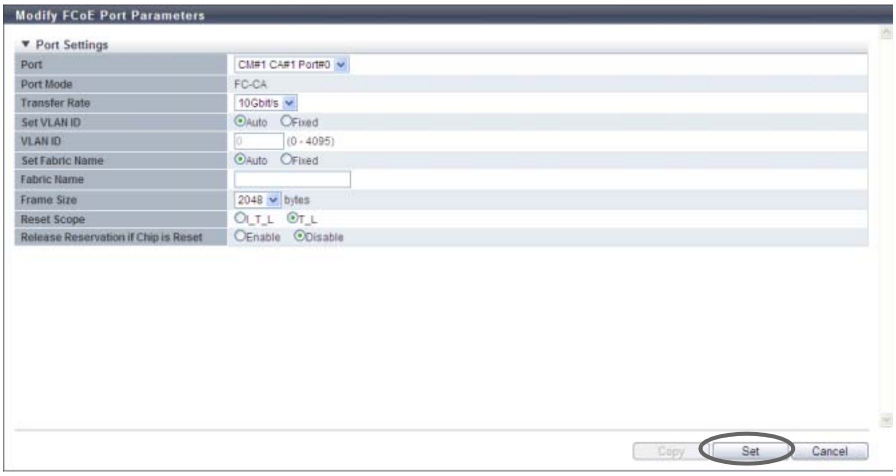
Note

Multiple selections can be made for the FCoE ports. To set the same parameters for multiple ports, set the parameters of the copy source port and click the [Copy] button. Select the copy destination port and click the [Copy] button. The parameters can be copied.
To set different parameters to multiple ports, select each target port and set the parameters.

2 Set the parameters for all of the selected ports and click the [Set] button.

- Port
  Select the target port or select the copy source port.
  The selectable port location options are displayed as options:
  - CM#x CA#y Port#z (x: CM number, y: CA number, z: Port number)
- Transfer Rate (Gbit/s)
  Set the transfer speed of the target port.
  - 10Gbit/s
- Set VLAN ID
  Specify "Auto" to enable the automatic setting for the VLAN ID of the target port. Specify "Fixed" to enable the fixed setting.
  When "Auto" is specified, VLAN ID is automatically obtained and no need to specify the VLAN ID.
  When "Fixed" is specified, specify the VLAN ID.
- VLAN ID
  Input the VLAN ID for the target port between 0 and 4095.
  Make sure to set the same value for the VLAN ID as the VLAN ID of the FCoE switch that is to be connected to.

- Set Fabric Name
  Specify "Auto" to enable the automatic setting for the fabric name of the target port. Specify "Fixed" to enable the fixed setting.
  When "Auto" is specified, the fabric name of the connected FCoE switch is automatically obtained and does not need to be specified.
  When "Fixed" is specified, enter the fabric name.
  "Auto" should be set for normal operation. When "Fixed" is specified, connection to any switch other than the specified FCoE switch cannot be performed.
- Fabric Name
  Input the fabric name (WWN of FCoE) of the target port.
- Frame Size
  Select the frame size of the target port.
  "Frame Size" specifies the length of the communication information.
  - 512 bytes
  - 1024 bytes
  - 2048 bytes
- Reset Scope
  Specify the reset scope of the target port.
  Reset scope is the range where the command reset from the server is performed, when the target port is connected to multiple servers.
  - I_T_L (I: Initiator, T: Target, L: LUN)
    Reset (cancel) the command request from the server that sent the command reset request.
  - T_L (T: Target, L: LUN)
    Reset (cancels) the command request from all of the servers that are connected to the port.
- Release Reservation if Chip is Reset
  Select whether to "Enable" or "Disable" the function to release the reserved status of the volume when the target port (chip) is reset.

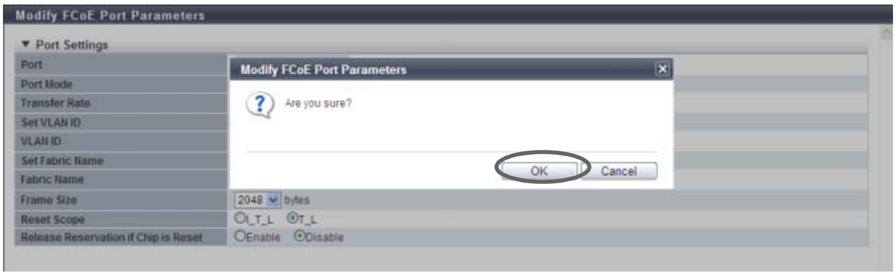


→ A confirmation screen appears.

Caution

If some parameters do not satisfy the input conditions, an error screen appears.

3 Click the [OK] button.



→ Modification of the FCoE port parameters starts.

4 Click the [Done] button to return to the [FCoE Port Group] screen.

End of procedure

9.2.3.11 Modify Port Mode

This function changes the port mode of each port among Channel Adapter (CA), Remote Adapter (RA), CA/RA, and Initiator.
The port modes of the FC port and the iSCSI port can be changed.

Switchable Port Mode

Port	Port Mode	Usage
FC Port	CA	CA is used for connecting to the host.
	RA	RA is used for performing REC.
	CA/RA	CA/RA is used for connecting the host and for performing REC.
	Initiator	Initiator is used for performing Storage Migration.
iSCSI Port	CA	CA is used for connecting to the host.
	RA	RA is used for performing REC.
	CA/RA	CA/RA is used for connecting the host and for performing REC.

Caution

- When changing the port mode of a running port from "CA" to "RA" or to "Initiator", make sure to stop the host access connected to the corresponding CA Port.
- When changing the port mode of a running port from "RA" to "CA" or to "Initiator", make sure to check that there is no session in the corresponding port.
- For details about mapping information and the Advanced Copy path information when changing the port mode, refer to "Retained and deleted information when changing the port mode" (page 572).
- The port mode of an FC-Initiator port that has Storage Migration paths cannot be changed.
- The port mode of a SAS port cannot be changed.
- The port mode of an FCoE port cannot be changed.
- When the Advanced Copy license is not registered, port mode cannot be changed to "RA" or "CA/RA".

Retained and deleted information when changing the port mode

		Port mode after modification			
		CA	RA	CA/RA	Initiator
Port mode before modification	CA	–	Mapping information is deleted	Mapping information is retained	Mapping information is deleted
	RA	Advanced Copy path information is deleted	–	• Advanced Copy path information is retained • REC Line No. is retained • REC Transfer Mode is retained	Advanced Copy path information is deleted
	CA/RA	• Mapping information is retained • Advanced Copy path information is deleted	• Mapping information is deleted • Advanced Copy path information is retained • REC Line No. is retained • REC Transfer Mode is retained	–	• Mapping information is deleted • Advanced Copy path information is deleted

Note

- If the port mode has been changed, the port parameter returns to the default setting. For REC line number and REC transfer mode, refer to "Retained and deleted information when changing the port mode" (page 572).
- When changing the port mode for FC-Initiator port, delete the path group specified in the target port. Refer to "11.2.11.3 Delete Storage Migration Path" (page 914) for details.

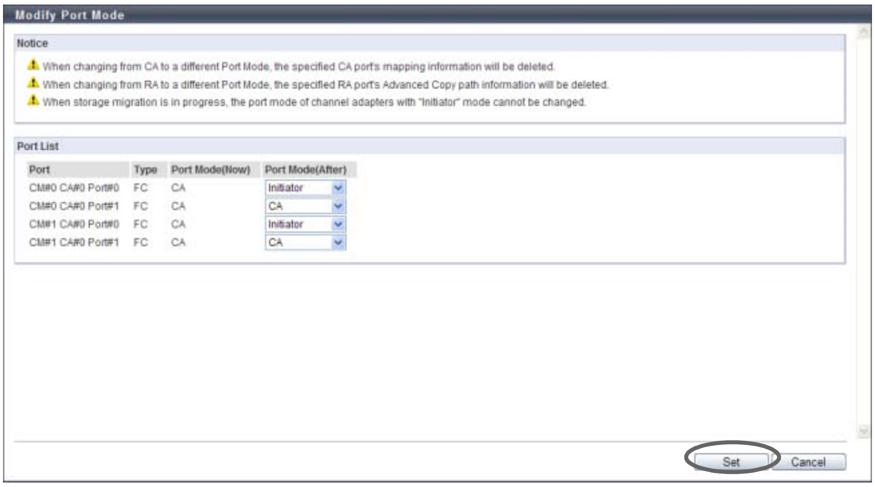
The procedure to change the port mode is as follows:

Procedure

1 Click [Modify Port Mode] in [Action].

2 Select the port mode to be changed over to, and click the [Set] button.

- Port Mode (After)
  Select from "CA", "RA", "CA/RA", or "Initiator" for the changed port mode.
  "Initiator" is displayed only for FC ports.
  The current port mode is displayed by default.
  - CA
  - RA
  - CA/RA
  - Initiator



→ A confirmation screen appears.

Caution

- If the specified FC-Initiator port is configured in Storage Migration path, an error screen appears.
- When using the ETERNUS DX80 S2, "RA" and "CA/RA" is not displayed in the "Port Mode (After)" field.

Note

"iSCSI-RA" type ports are not displayed in the port list.

3 Click the [OK] button.



→ Port mode changeover starts.

4 Click the [Done] button to return to the [CA Port Group] screen.

End of procedure

9.2.4 LUN Group Management

LUN group management provides the following functions:

- Add LUN Group
- Delete LUN Group
- Modify LUN Group

9.2.4.1 Add LUN Group

This function creates a new LUN group, and allocates a volume number in the ETERNUS DX Disk storage system to the LUN, which can be recognized by the host.
Up to 1024 LUN groups (2048 for the ETERNUS DX8700 S2) can be created in the ETERNUS DX Disk storage system.

Caution

- Only the volumes with "Standard", "WSV", "TPV", "FTV", or "SDV" volume types can be registered in the LUN group. "SDPV" volumes cannot be registered in the LUN group.
- A LUN group cannot be created when no volumes have been registered in the ETERNUS DX Disk storage system.
- Up to 4096 LUNs can be created. Note that the LUNs that can be accessed from the host vary depending on the "Host Specific Mode" setting of the host response when the host affinity setting is used to allocate a specific host group.
  - Normal (Default)
    256 LUNs (LUN#0 - LUN#255) can be accessed
    (LUN#256 - LUN#4095 cannot be accessed)
  - AIX Mode
    512 LUNs (LUN#0 - LUN#511) can be accessed
    (LUN#512 - LUN#4095 cannot be accessed)
  - NR1000V Mode
    512 LUNs (LUN#0 - LUN#511) can be accessed
    (LUN#512 - LUN#4095 cannot be accessed)
  - HP-UX Mode
    1024 LUNs (LUN#0 - LUN#1023) can be accessed
    (LUN#1024 - LUN#4095 cannot be accessed)
  - BS2000 Mode
    4096 LUNs (LUN#0 - LUN#4095) can be accessed

  When the host affinity setting is used to allocate all of the hosts (specify "All"), 256 LUNs (LUN#0 - LUN#255) can be accessed.

- Note that if a LUN group to which volumes are mapped from LUN#512 onward exists, the maximum number of LUN groups cannot be created.
  This is because when volumes are mapped for LUN#512 onward, an additional LUN group is created as an internal resource for every 512 LUNs. For example, when volumes are mapped from LUN#0 to LUN#520, two LUN groups are created (one for LUNs #0 to #511 and one for LUNs #512 to #520).
- Volumes with the mirroring reservation attribute (*1) cannot be registered in a LUN group. Volumes in this status are not displayed in the "Select Volume" field.
- An ODX Buffer volumes cannot be registered in the LUN group.

*1: The mirroring reservation attribute is applied to the volumes that are being created as an REC copy path by the Dynamic LUN Mirroring function. Volumes that are not successfully created may have this attribute. Volumes that have the mirroring reservation attribute can be checked in the "Forbid Advanced Copy" field on the [Volume] screen. Refer to "5.1.1 Volume (Basic Information)" (page 74) for details.

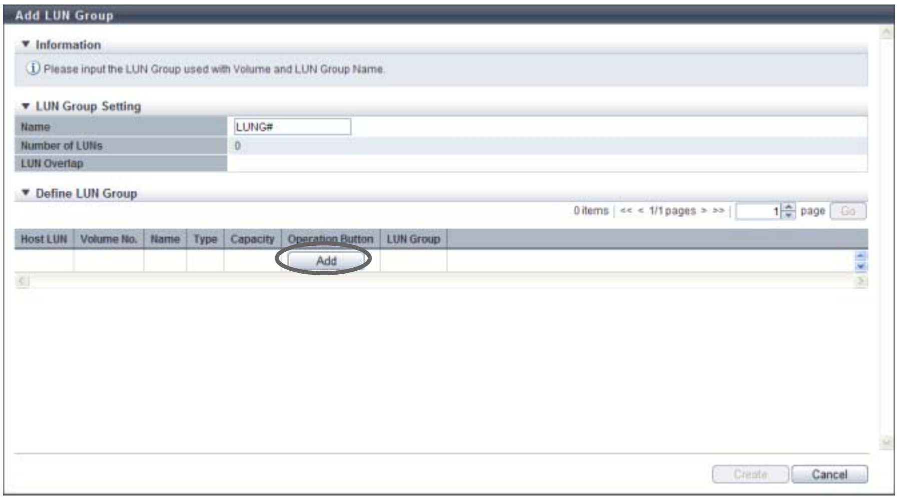
The procedure to create a LUN group is as follows:

Procedure

1 Click [Add LUN Group] in [Action].

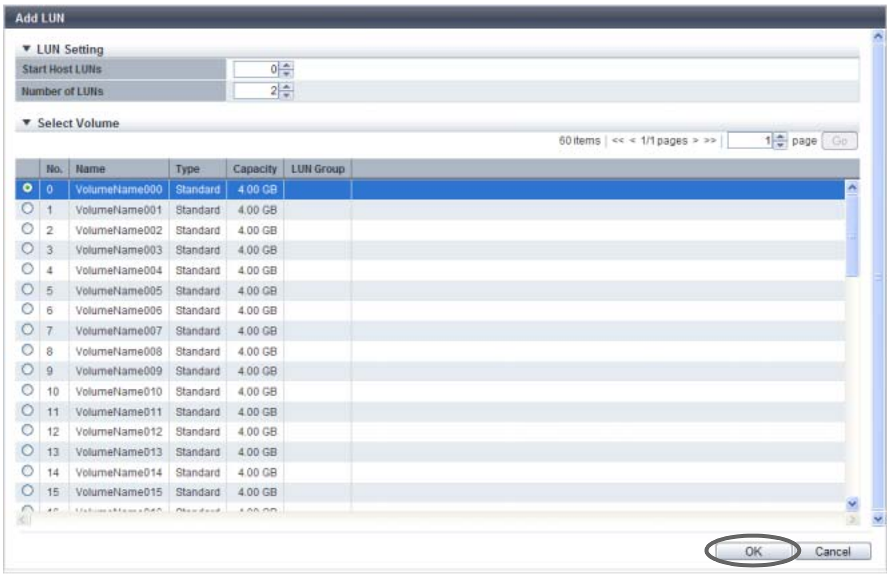
2 Specify the LUN group name, and click the [Add] button.

- Name
  Specify the LUN group name.
  An existing LUN group name cannot be specified.
  The following input conditions apply:
  - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space



3 Specify the LUNs and the number of LUNs, to allocate volumes to, select the volume numbers to be allocated to the corresponding LUNs, and click the [OK] button.

- Start Host LUNs
  Specify the LUN from which allocation is to be started. The smallest LUN among the available LUNs is used as the default value.
  The following input condition applies:
  - "0" - "4095" (decimal)
- Number of LUNs
  The number of LUNs, to which the volumes are allocated, is displayed.
  The following input condition applies:
  - "1" - "4096" (decimal)
- Select Volume
  Use the radio button to select which volume number the allocation is to be started from.



Caution

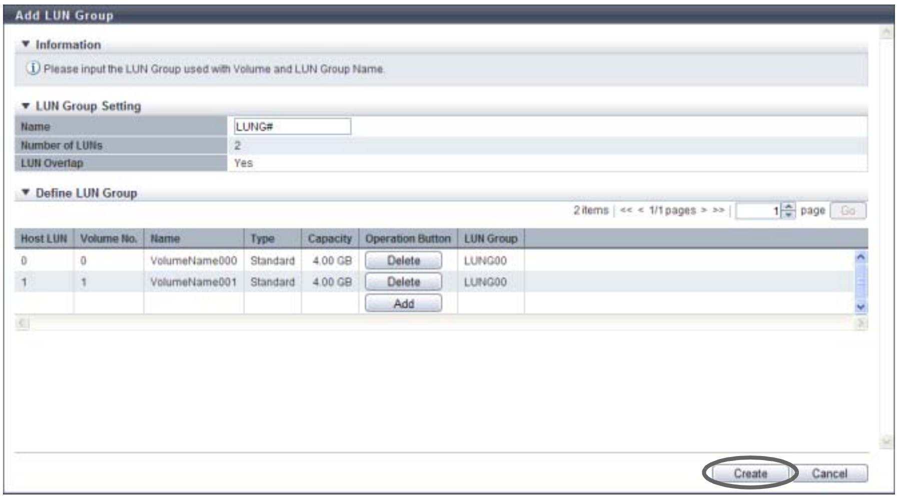
An error screen appears in the following conditions:

- The LUN volume, which is specified in "Start Host LUNs", has already been allocated to a different LUN
- The LUN volumes, which have been specified in "Number of LUNs", cannot be allocated to the necessary number of LUNs
- The selected volume already exists in the corresponding LUN group

Note

To delete the LUN and the volume allocation information from a LUN group, click the [Delete] button for the allocation information to be deleted.

4 Check the LUN and the volume allocation information to be registered in the LUN group, click the [Create] button.



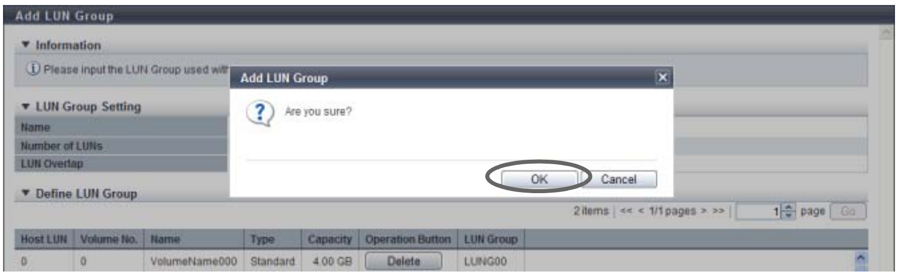
→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When the LUN group name, which you entered in the "Name" field, has the same name as an existing LUN group
- When the LUN group name, which you entered in the "Name" field, does not satisfy the input conditions
- When the "Name" field is not input
- When the total number of LUN groups has reached the maximum number of storage systems
- When the selected volume does not exist

5 Click the [OK] button.



→ Adding LUN group starts.

6 Click the [Done] button to return to the [LUN Group] screen.

End of procedure

9.2.4.2 Delete LUN Group

This function deletes LUN groups.

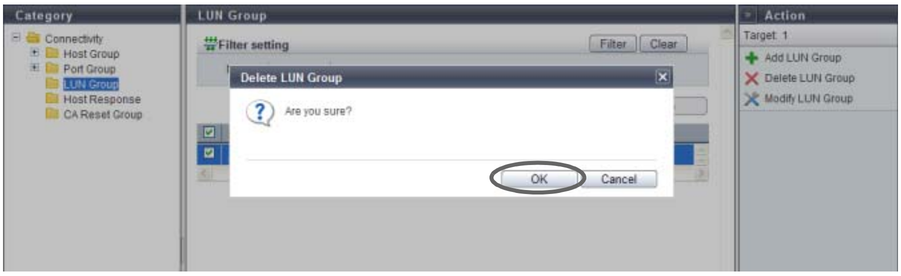
Caution

The LUN groups, which are being used in the Host Affinity settings, cannot be deleted.

The procedure to delete a LUN group is as follows:

Procedure

1. Select the LUN group that is to be deleted, and click [Delete LUN Group] in [Action].
   → A confirmation screen appears.
2. Click the [OK] button.



   → LUN group deletion starts.

   Caution

   An error screen appears in the following conditions:
   - When the selected LUN group is being used in the Host Affinity settings
   - When the selected LUN group does not exist

3. Click the [Done] button to return to the [LUN Group] screen.

End of procedure

9.2.4.3 Modify LUN Group

This function modifies LUN groups.

Caution

- When changing or deleting the volume allocation in a running LUN group, stop access from the associated host.
- When adding LUNs or volume allocation to a running LUN group, stopping access from the associated host is not necessary.
- Only the volumes with "Standard", "WSV", "TPV", "FTV", or "SDV" volume types can be registered in the LUN group. "SDPV" volumes cannot be registered in the LUN group.
- Volumes with the mirroring reservation attribute (*1) cannot be registered in a LUN group. Volumes in this status are not displayed in the "Select Volume" field.
- ODX Buffer volumes cannot be registered in the LUN group.

*1: The mirroring reservation attribute is applied to the volumes that are being created as an REC copy path by the Dynamic LUN Mirroring function. Volumes that are not successfully created may have this attribute. Volumes that have the mirroring reservation attribute can be checked in the "Forbid Advanced Copy" field on the [Volume] screen. Refer to "5.1.1 Volume (Basic Information)" (page 74) for details.

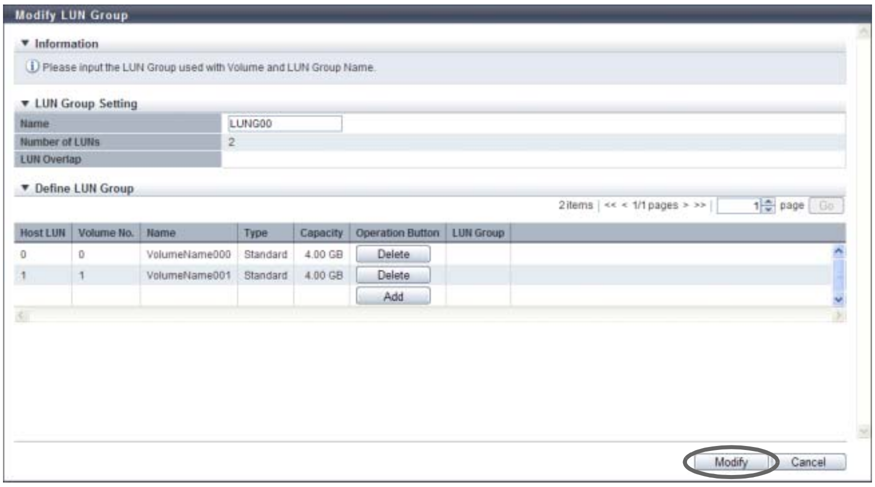
The procedure to modify a LUN group is as follows:

Procedure

1 Select the LUN group that is to be changed, and click [Modify LUN Group] in [Action].

2 Change the LUN group name and its volume allocation information, and click the [Modify] button.

- Name
  Modify the LUN group name.
  An existing LUN group name cannot be specified.
  The following input conditions apply:
  - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

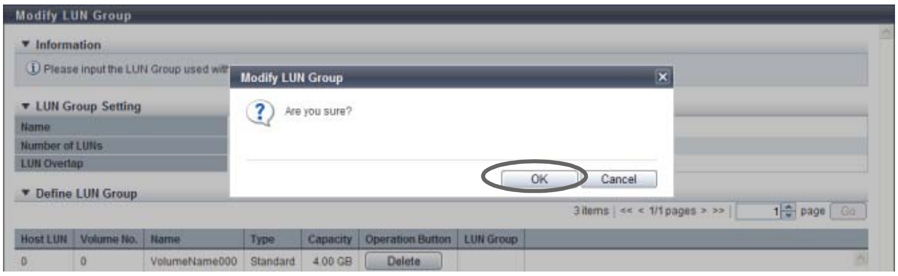
- When the LUN group name, which you entered in the "Name" field, has the same name as an existing LUN group
- When the LUN group name, which you entered in the "Name" field, does not satisfy the input conditions
- When the "Name" field is not input
- When the selected volume does not exist

Note

The volume allocation information can be edited while performing the procedure in "9.2.4.1 Add LUN Group" (page 574).

- To add the LUN and the volume allocation, click the [Add] button.
- To delete the LUN and the volume allocation information, click the [Delete] button for the allocation information to be deleted.
- To change the LUN and the volume allocation information, delete the allocation information to be changed. Change the allocation volume, and add it to the LUN group again.

3 Click the [OK] button.



→ LUN group modification starts.

Caution

Some LUNs cannot be recognized if one of the following conditions applies to "Host Specific Mode" for which the host response is allocated to a host group with host affinity settings. When adding LUNs to a LUN group, check "Host Specific Mode" for the host response.

- When "Host Specific Mode" is "Normal (Default)", any LUNs that are added from LUN#256 onward
- When "Host Specific Mode" is "AIX Mode" or "NR1000V Mode", any LUNs that are added from LUN#512 onward
- When the "Host Specific Mode" is "HP-UX Mode", any LUNs that are added from LUN#1024 onward

4 Click the [Done] button to return to the [LUN Group] screen.

End of procedure

9.2.5 Host Response Management

Host Response management provides the following functions:

- Add Host Response
- Delete Host Response
- Modify Host Response

9.2.5.1 Add Host Response

This function adds a host response.
The maximum number of host responses per storage system is 256, including the recommended patterns.
For more details on setting the host response parameters, refer to "User's Guide -Server Connection-" for each OS type.

Caution

- If an appropriate host response is not configured to the host affinity, the path may not be switched correctly or the volume may not be recognized correctly.
- When customizing the host response, make sure to understand the setting parameters and create the host response with careful attention.

Note

- Assign a host response when adding or changing a host group. Refer to the following functions:
  - "9.2.2.1 Add FC/FCoE Host Group" (page 440)
  - "9.2.2.2 Add iSCSI Host Group" (page 448)
  - "9.2.2.3 Add SAS Host Group" (page 456)
  - "9.2.2.5 Modify Host Group" (page 463)
- Assign a host response when adding or changing a host. Refer to the following functions:
  - "9.2.2.9 Add FC/FCoE Host" (page 487)
  - "9.2.2.10 Add iSCSI Host" (page 492)
  - "9.2.2.11 Add SAS Host" (page 499)
  - "9.2.2.15 Modify FC/FCoE Host" (page 507)
  - "9.2.2.16 Modify iSCSI Host" (page 509)
  - "9.2.2.17 Modify SAS Host" (page 514)
- Refer to "9.2.5.3 Modify Host Response" (page 589) to edit host responses.

Recommended Patterns of Host Responses

Make sure to use the appropriate recommended pattern in the following connection environment. Select "Default" in other connection environments.

Host Response Name	Connection Environment	Settings
Solaris MPxIO	This setting is for a host on which Oracle Solaris has been installed, and which uses OS standard Multipath Driver (MPxIO).	Reservation Conflict Response for Test Unit Ready: Conflict Other parameters are the same as "Default".
HP-UX	This setting is for a host on which HP-UX has been installed.	Host Specific Mode: HP-UX Mode "Load Balance" setting in the [Setup Subsystem Parameters] function: Disable Other parameters are the same as "Default".
AIX EMPD (*1)	This setting is for a host on which AIX has been installed, and which uses ETERNUS Multipath Driver.	Reservation Conflict Response for Test Unit Ready: Conflict Host Specific Mode: AIX Mode Other parameters are the same as "Default".
AIX VxVM	This setting is for a host on which AIX has been installed, and which uses VERITAS Volume Manager (VxVM).	Host Specific Mode: AIX Mode Other parameters are the same as "Default".
AIX Single Path	This setting is for a host with a single path on which AIX has been installed.	Reservation Conflict Response for Test Unit Ready: Conflict Host Specific Mode: AIX Mode Other parameters are the same as "Default".
VS850/SVC	This setting is used when connecting via ETERNUS VS850 Virtualization Storage and SVC.	Byte-0 of Inquiry Response: 0x20 Conversion mode Inquiry VPD ID Type: Type1 Reservation Conflict Response for Test Unit Ready: Conflict Change Volume Mapping: Report Volume Capacity Expansion: Report Other parameters are the same as "Default".
Default	This setting is for host connection environments that are not listed above.	Byte-0 of Inquiry Response: No Conversion (Default) Inquiry VPD ID Type: Type3 (Default) Inquiry Standard Data Version: Version 5 (Default) Command Timeout Interval: Default (25sec.) Load Balance Response: Unit Attention (Default) Reservation Conflict Response for Test Unit Ready: Normal (Default) Change Volume Mapping: No Report (Default) Volume Capacity Expansion: No Report (Default) Vendor Unique Sense Code: No Report (Default) Host Specific Mode: Normal (Default) Asymmetric / Symmetric Logical Unit Access: For ETERNUS DX80 S2/DX90 S2, ETERNUS DX410 S2/ DX440 S2, ETERNUS DX8100 S2: ACTIVE-ACTIVE / PREFERRED_PATH (Default) For ETERNUS DX8700 S2: ACTIVE/ACTIVE (Default) iSCSI Discovery Response Mode: All - Reply All Ports (Default) TPGS Mode: Enable (Default) TPG Referrals: Disable (Default) iSCSI Reservation Range: CA Port (Default) Sense Data Conversion: No Conversion (Default)

*1: EMPD: ETERNUS Multipath Driver

Caution

The following modifications are applied for the recommended patterns of host response with firmware version V10L15 or later.

- "Others" is changed to "Default".
- "Windows EMPD", "Linux EMPD", and "Solaris EMPD" are deleted from the "Host Response" value. The setting parameters for "Windows EMPD", "Linux EMPD", and "Solaris EMPD" are the same as "Default".

The procedure to add a host response is as follows:

Procedure

1 Click [Add Host Response] in [Action].

2 Specify the host response name, set each parameter, and click the [Add] button.

Caution

- There is a recommended host response pattern which has been prepared for each OS type. Make sure to select the appropriate recommended pattern. Refer to " Recommended Patterns of Host Responses" (page 582) for details.
- When customizing the host response, make sure to create a new host response using "Setting parameters".

Setting parameters

- Name
  Specify the host response name.
  An existing host response name cannot be specified.
  The following input conditions apply:
  - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space
- Byte-0 of Inquiry Response
  Set the conversion mode for the Byte-0 value of the Inquiry command.
  For a certain period of time after the link between the ETERNUS DX Disk storage system and the host has been established, the host sends an "Inquiry" command to check the volume status in the storage system. Specify the Byte-0 of the Inquiry data to respond this "Inquiry" command.
  Byte-0 in the Inquiry data indicates the volume status.
  - No Conversion (Default)
    Responds with the value specified in the ETERNUS DX Disk storage system.
  - 0x7F Conversion mode
    When the Byte-0 is "0x20 (configuration is available, unformatted)", converts the Byte-0 value to "0x7f (configuration is not available)" and responds.
  - 0x20 Conversion mode
    When the Byte-0 is "0x3f (unknown device that cannot be accessed)", converts the Byte-0 value to "0x20 (configuration is available, unformatted)" and responds.

- Inquiry VPD ID Type
  Set the Vital Product Data (VPD) information type to respond to the host.
  VPD information includes the device information (Vendor ID, Product ID for each model, volume number, etc.) for the volume.
  Type1 and Type3 indicate the data format.
  - Type3 (Default)
  - Type1
  - Type1 + Type3
- Inquiry Standard Data Version
  Specify the Standard Data Version (version number of the SCSI standard) of the "Inquiry" command.
  - Version 5 (Default)
  - Version 4
  - Version 3
- Command Timeout Interval
  Select the setting method for the command timeout interval from the following items.
  - Default (25sec.)
  - Customize
    When "Customize" is selected, input a value between 10 and 255 seconds (numeric).
- Load Balance Response
  This field sets the response status when an overload-derived timeout is detected. The server retry reaction is determined by this setting.
  While the default response should normally be compatible with all systems, the setting may need to be changed if problems occur.
  - Unit Attention (Default)
  - Busy
  - Queue Full
- Reservation Conflict Response for Test Unit Ready
  Select whether or not to notify the Reservation Conflict to the Test Unit Ready command when volumes have been reserved from the other host.
  - Normal (Default)
  - Conflict
- Change Volume Mapping
  Select whether or not to report to the host when a volume, which can be accessed from the host, has been added or deleted.
  - No Report (Default)
  - Report
- Volume Capacity Expansion
  Select whether or not to report to the host when the capacity of a volume has been changed.
  - No Report (Default)
  - Report
- Vendor Unique Sense Code
  Select whether or not to report the asynchronous sense code to the host.
  Asynchronous sense code indicates the unique sense code for each vendor that is not coincident with host I/O.
  - No Report (Default)
  - Report

- Host Specific Mode
  Select the operation for a specific host.
  - Normal (Default)
    Up to 256 LUNs (LUN#0 - LUN#255) can be accessed.
  - AIX Mode
    Select this to prevent the command initialization and performance degradation. Up to 512 LUNs (LUN#0 - LUN#511) can be accessed.
  - HP-UX Mode
    Up to 1024 LUNs (LUN#0 - LUN#1023) can be accessed.
  - NR1000V Mode
    Up to 512 LUNs (LUN#0 - LUN#511) can be accessed.
  - BS2000 Mode
    Select this mode when connecting to hosts in which BS2000 is installed as the OS. Up to 4096 LUNs (LUN#0 - LUN#4095) can be accessed.

Caution

The "Linux/NR1000V Mode" host specific mode is "NR1000V Mode" for firmware version V10L25 or later. When "Linux" is used as the host OS, select the recommended "Default" pattern as the host response.

- Asymmetric / Symmetric Logical Unit Access
  Select the access type from the host to a volume.
  - ACTIVE-ACTIVE / PREFERRED_PATH
    When multiple paths are used for connection between the host and the ETERNUS DX Disk storage system, there are recommended paths and non-recommended paths. While the volume can be accessed by using either type of path, if a non-recommended path is used, the responses to the host may require a longer period of time.
  - ACTIVE / ACTIVE
    When multiple paths are used for connection between the host and the ETERNUS DX Disk storage system, any paths can be used equally.

Caution

When "ACTIVE / ACTIVE" is set for the ETERNUS DX80 S2/DX90 S2, the ETERNUS DX410 S2/DX440 S2, or the ETERNUS DX8100 S2, the load balancing function of the multipath software in the server may perform data transfer between controllers. This may cause a reduction in performance.

- iSCSI Discovery Reply Mode
  Select the reply mode for the iSCSI Discovery request.
  - All - Reply All Ports (Default)
    Replies to the server with the information for all the iSCSI ports (iSCSI names and IP addresses).
  - Port - Reply Target Port Only
    Replies to the server with only the information for the specified iSCSI ports (iSCSI names and IP addresses).

Caution

When connecting the Citrix XenServer and the iSCSI port, select "Port - Reply Target Port Only".

- TPGS Mode
Select whether to enable or disable the Target Port Group Support (TPGS) mode.
  - Enable (Default)
  - Disable

Caution

The "TPGS Mode" setting is applied only when "Version 5 (Default)" is selected for the "Inquiry Standard Data Version" setting. When a value other than "Version 5 (Default)" is selected, the host response setting completes successfully but the "TPGS Mode" setting is not applied for the ETERNUS DX Disk storage system.

- TPG Referrals
Select whether to enable or disable the TPG Referrals.
The TPG Referrals function determines the priority path for each block when accessing volumes via the ETERNUS Multipath Driver in order to prevent cross access. This function can be used for "Standard", "WSV", "TPV", "FTV", and "Standard (LUN concatenated)" type volumes.
  - Enable
  - Disable (Default)

Caution

The TPG Referrals function performs normally when "Enable" is selected and all of the following conditions apply:

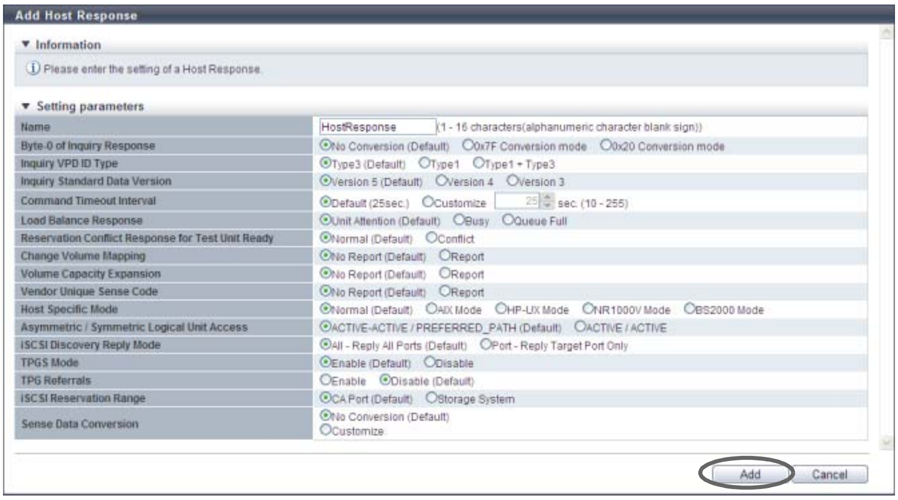
- The ETERNUS Multipath Driver supports the TPG Referrals function
- "Version 5 (Default)" is selected for "Inquiry Standard Data Version"
- "Enable (Default)" is selected for "TPGS Mode"

- iSCSI Reservation Range
Select the reservation management range for iSCSI connection from the CA ports or the storage systems.
  - CA Port (Default)
  The reservation status of volumes is managed for each CA port. This is the conventional iSCSI reservation management range.
  - Storage System
  The reservation status of volumes is managed for each storage system. Select this item when an iSCSI connection is configured in a VMware environment. Reservation status remains for volumes when a path is disconnected. This prevents Virtual Machine from hanging up.

Caution

Confirm that the CA ports that configure the iSCSI connection in the VMware environment are registered in the same CA reset group. All of the CA ports are registered in the same CA reset group by default.

- Sense Data Conversion
  Select the sense code conversion pattern.
  - No Conversion (Default)
  - Customize
    Customize sense data conversion. Select "Customize" to display the sense data conversion setting field.
- Sense Data Conversion
  - From SK/ASC/ASCQ
  - To SK/ASC/ASCQ
    Customize sense data conversion.
    Click the [Add] button. Input SK/ASC/ASCQ of the conversion target in the "From" field, and SK/ASC/ASCQ of the conversion destination in the "To" field.
    "From SK/ASC/ASCQ" and "To SK/ASC/ASCQ" values are specified in pairs. The sense data that matches the "From SK/ASC/ASCQ" value is changed to the specified "To SK/ASC/ASCQ" value.
    "*" indicates a wild-card, and targets all values.
    The maximum number of sense data conversions is eight patterns.
    Sense Key (SK): SK indicates sense keys included in the sense information.
    Additional Sense Code (ASC): ASC indicates sense codes included in the sense information.
    Additional Sense Code Qualifier (ASCQ): ASCQ indicates additional sense code qualifier included in the sense information.
    [Example 1]
    The sense information (4/f1/0) is converted to (4/f1/1) before responding to the host.
    From SK/ASC/ASCQ: 4/f1/0
    To SK/ASC/ASCQ: 4/f1/1
    [Example 2]
    The sense information (4/f1/0 - ff) is converted to (6/f1/0 - ff) before responding to the host.
    "*" indicates all patterns from "0" to "ff". The "*" part is not converted.
    From SK/ASC/ASCQ: 4/f1/*
    To SK/ASC/ASCQ: 6/f1/*



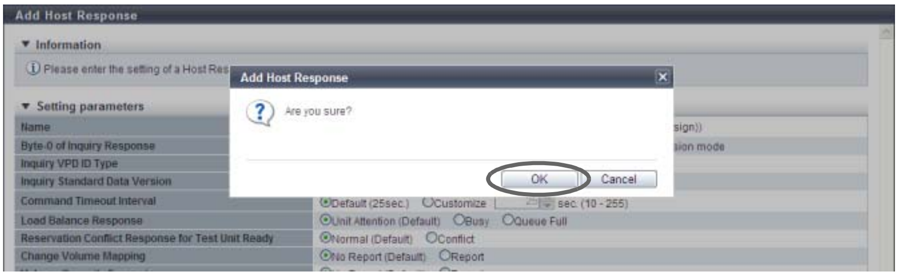
→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When the "Name" does not satisfy the input conditions
- When the "Name" has not been entered

3 Click the [OK] button.



→ Addition of the host response starts.

Caution

An error screen appears in the following conditions:

- When the "Name" matches with an existing host response name
- When the total number of host responses has exceeded the maximum number of host responses for the ETERNUS DX Disk storage system

4 Click the [Done] button to return to the [Host Response] screen.

End of procedure

9.2.5.2 Delete Host Response

This function deletes a host response.

Caution

- When deleting an active host response, stop the access from the host group which the host response has been assigned to.
- If an active host response is deleted, the host response setting will return to the initial state.
- The recommended pattern of the host response cannot be changed and deleted.

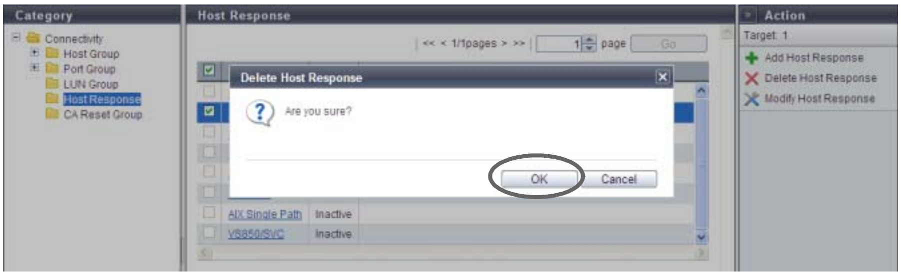
The procedure to delete a host response is as follows:

Procedure

1 Select the host response to be deleted (multiple selections can be made) and click [Delete Host Response] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ Deletion of the host response starts.

3 Click the [Done] button to return to the [Host Response] screen.

End of procedure

9.2.5.3 Modify Host Response

This function modifies host response settings.
For more details on setting the host response parameters, refer to "User's Guide -Server Connection-" for each OS type.

Caution

- When editing an active host response, stop the access from the host group to which the host response has been assigned.
- If an appropriate host response is not configured to the host affinity, the path may not be switched correctly or the volume may not be recognized correctly.
- When customizing the host response, make sure to understand the setting parameters and create the host response with careful attention.
- The recommended pattern and the default setting of the host response cannot be modified.

Note

- Assign a host response when adding or changing a host group. Refer to the following functions:
  - "9.2.2.1 Add FC/FCoE Host Group" (page 440)
  - "9.2.2.2 Add iSCSI Host Group" (page 448)
  - "9.2.2.3 Add SAS Host Group" (page 456)
  - "9.2.2.5 Modify Host Group" (page 463)
- Assign a host response when adding or changing a host. Refer to the following functions:
  - "9.2.2.9 Add FC/FCoE Host" (page 487)
  - "9.2.2.10 Add iSCSI Host" (page 492)
  - "9.2.2.11 Add SAS Host" (page 499)
  - "9.2.2.15 Modify FC/FCoE Host" (page 507)
  - "9.2.2.16 Modify iSCSI Host" (page 509)
  - "9.2.2.17 Modify SAS Host" (page 514)
- Refer to "9.2.5.3 Modify Host Response" (page 589) to edit host responses.

The procedure to edit a host response is as follows:

Procedure

1 Select the host response to be modified, and click [Modify Host Response] in [Action].

2 Modify the host response name or each item, and click the [Modify] button.

Setting parameters

- Name
  Specify the host response name.
  An existing host response name cannot be specified.
  The following input conditions apply:
  - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Space
- Byte-0 of Inquiry Response
  Set the conversion mode for the Byte-0 value of the Inquiry command.
  For a certain period of time after the link between the ETERNUS DX Disk storage system and the host has been established, the host sends an "Inquiry" command to check the volume status in the storage system. Specify the Byte-0 of the Inquiry data to respond this "Inquiry" command.
  Byte-0 in the Inquiry data indicates the volume status.
  - No Conversion (Default)
    Responds with the value specified in the ETERNUS DX Disk storage system.
  - 0x7F Conversion mode
    When the Byte-0 is "0x20 (configuration is available, unformatted)", converts the Byte-0 value to "0x7f (configuration is not available)" and responds.
  - 0x20 Conversion mode
    When the Byte-0 is "0x3f (unknown device that cannot be accessed)", converts the Byte-0 value to "0x20 (configuration is available, unformatted)" and responds.
- Inquiry VPD ID Type
  Set the Vital Product Data (VPD) information type to respond to the host.
  VPD information includes the device information (Vendor ID, Product ID for each model, volume number, etc.) for the volume.
  Type1 and Type3 indicate the data format.
  - Type3 (Default)
  - Type1
  - Type1 + Type3
- Inquiry Standard Data Version
  Specify the Standard Data Version (version number of the SCSI standard) of the "Inquiry" command.
  - Version 5 (Default)
  - Version 4
  - Version 3
- Command Timeout Interval
  Select the setting method for the command timeout interval from the following items.
  - Default (25sec.)
  - Customize
    When "Customize" is selected, input a value between 10 and 255 seconds (numeric).

- Load Balance Response
  This field sets the response status when an overload-derived timeout is detected. The server retry reaction is determined by this setting.
  While the default response should normally be compatible with all systems, the setting may need to be changed if problems occur.
  - Unit Attention (Default)
  - Busy
  - Queue Full
- Reservation Conflict Response for Test Unit Ready
  Select whether or not to notify the Reservation Conflict to the Test Unit Ready command when volumes have been reserved from the other host.
  - Normal (Default)
  - Conflict
- Change Volume Mapping
  Select whether or not to report to the host when a volume, which can be accessed from the host, has been added or deleted.
  - No Report (Default)
  - Report
- Volume Capacity Expansion
  Select whether or not to report to the host when the capacity of a volume has been changed.
  - No Report (Default)
  - Report
- Vendor Unique Sense Code
  Select whether or not to report the asynchronous sense code to the host.
  Asynchronous sense code indicates the unique sense code for each vendor that is not coincident with host I/O.
  - No Report (Default)
  - Report
- Host Specific Mode
  Select the operation for a specific host.
  - Normal (Default)
    Up to 256 LUNs (LUN#0 - LUN#255) can be accessed.
  - AIX Mode
    Select this to prevent the command initialization and performance degradation. Up to 512 LUNs (LUN#0 - LUN#511) can be accessed.
  - HP-UX Mode
    Up to 1024 LUNs (LUN#0 - LUN#1023) can be accessed.
  - NR1000V Mode
    Up to 512 LUNs (LUN#0 - LUN#511) can be accessed.
  - BS2000 Mode
    Select this mode when connecting to hosts in which BS2000 is installed as the OS. Up to 4096 LUNs (LUN#0 - LUN#4095) can be accessed.

Caution

The "Linux/NR1000V Mode" host specific mode is "NR1000V Mode" for firmware version V10L25 or later. When "Linux" is used as the host OS, select the recommended "Default" pattern as the host response.

- Asymmetric / Symmetric Logical Unit Access
  Select the access type from the host to a volume.
  - ACTIVE-ACTIVE / PREFERRED_PATH
    When multiple paths are used for connection between the host and the ETERNUS DX Disk storage system, there are recommended paths and non-recommended paths. While the volume can be accessed by using either type of path, if a non-recommended path is used, the responses to the host may require a longer period of time.
  - ACTIVE / ACTIVE
    When multiple paths are used for connection between the host and the ETERNUS DX Disk storage system, any paths can be used equally.

Caution

When "ACTIVE / ACTIVE" is set for the ETERNUS DX80 S2/DX90 S2, the ETERNUS DX410 S2/DX440 S2, or the ETERNUS DX8100 S2, the load balancing function of the multipath software in the server may perform data transfer between controllers. This may cause a reduction in performance.

- iSCSI Discovery Reply Mode
  Select the reply mode for the iSCSI Discovery request.
  - All - Reply All Ports (Default)
    Replies to the server with the information for all the iSCSI ports (iSCSI names and IP addresses).
  - Port - Reply Target Port Only
    Replies to the server with only the information for the specified iSCSI ports (iSCSI names and IP addresses).

Caution

When connecting the Citrix XenServer and the iSCSI port, select "Port - Reply Target Port Only".

- TPGS Mode
  Select whether to enable or disable the Target Port Group Support (TPGS) mode.
  - Enable (Default)
  - Disable

Caution

The "TPGS Mode" setting is applied only when "Version 5 (Default)" is selected for the "Inquiry Standard Data Version" setting. When a value other than "Version 5 (Default)" is selected, the host response setting completes successfully but the "TPGS Mode" setting is not applied for the ETERNUS DX Disk storage system.

- TPG Referrals
  Select whether to enable or disable the TPG Referrals.
  The TPG Referrals function determines the priority path for each block when accessing volumes via the ETERNUS Multipath Driver in order to prevent cross access. This function can be used for "Standard", "WSV", "TPV", "FTV", and "Standard (LUN concatenated)" type volumes.
  - Enable
  - Disable (Default)

Caution

The TPG Referrals function performs normally when "Enable" is selected and all of the following conditions apply:

- The ETERNUS Multipath Driver supports the TPG Referrals function
- "Version 5 (Default)" is selected for "Inquiry Standard Data Version"
- "Enable (Default)" is selected for "TPGS Mode"

- iSCSI Reservation Range
  Select the reservation management range for iSCSI connection from the CA ports or the storage systems.
  - CA Port (Default)
    The reservation status of volumes is managed for each CA port. This is the conventional iSCSI reservation management range.
  - Storage System
    The reservation status of volumes is managed for each storage system. Select this item when an iSCSI connection is configured in a VMware environment. Reservation status remains for volumes when a path is disconnected. This prevents Virtual Machine from hanging up.

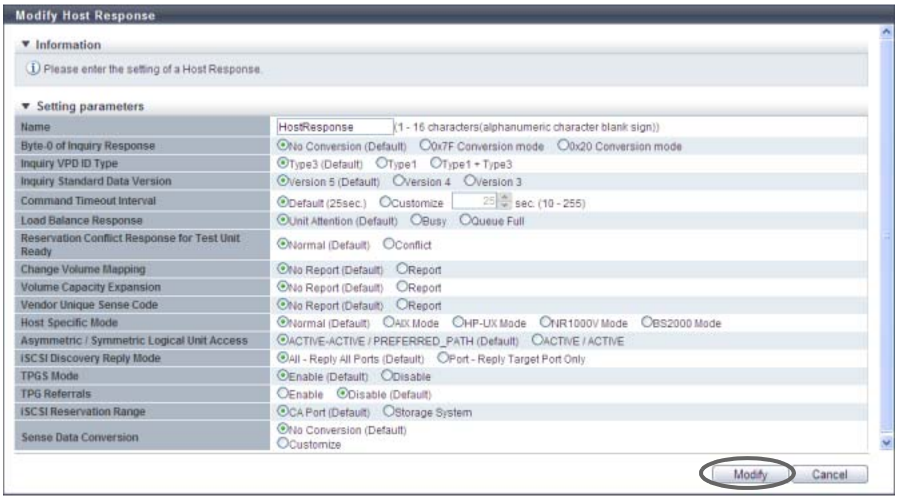
Caution

Confirm that the CA ports that configure the iSCSI connection in the VMware environment are registered in the same CA reset group. All of the CA ports are registered in the same CA reset group by default.

- Sense Data Conversion
  Select the sense code conversion pattern.
  - No Conversion (Default)
  - Customize
    Customize sense data conversion. Select "Customize" to display the sense data conversion setting field.

- Sense Data Conversion
  - From SK/ASC/ASCQ
  - To SK/ASC/ASCQ
    Customize sense data conversion.
    Click the [Add] button. Input SK/ASC/ASCQ of the conversion target in the "From" field, and SK/ASC/ASCQ of the conversion destination in the "To" field.
    "From SK/ASC/ASCQ" and "To SK/ASC/ASCQ" values are specified in pairs. The sense data that matches the "From SK/ASC/ASCQ" value is changed to the specified "To SK/ASC/ASCQ" value.
    "*" indicates a wild-card, and targets all values.
    The maximum number of sense data conversions is eight patterns.

    Sense Key (SK): SK indicates sense keys included in the sense information.
    Additional Sense Code (ASC): ASC indicates sense codes included in the sense information.
    Additional Sense Code Qualifier (ASCQ): ASCQ indicates additional sense code qualifier included in the sense information.
    [Example 1]
    The sense information (4/f1/0) is converted to (4/f1/1) before responding to the host.
    From SK/ASC/ASCQ: 4/f1/0
    To SK/ASC/ASCQ: 4/f1/1
    [Example 2]
    The sense information (4/f1/0 - ff) is converted to (6/f1/0 - ff) before responding to the host.
    "*" indicates all patterns from "0" to "ff". The "*" part is not converted.
    From SK/ASC/ASCQ: 4/f1/*
    To SK/ASC/ASCQ: 6/f1/*



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:
- When the "Name" does not satisfy the input conditions
- When the "Name" has not been entered

3 Click the [OK] button.



→ Modification of the host response starts.

Caution

An error screen appears in the following conditions:

- When the "Name" matches with an existing host response name
- When performing one of the following modifications in "Host Specific Mode" for which the host response is allocated to a host group with host affinity settings:
  - Select other than "BS2000 Mode" for "Host Specific Mode" when volumes are mapped from LUN#1024 onward
  - Select other than "HP-UX Mode" or "BS2000 Mode" for "Host Specific Mode" when volumes are mapped from LUN#512 onward

4 Click the [Done] button to return to the [Host Response] screen.

End of procedure

9.2.6 Modify CA Reset Group

This function edits a CA reset group.
All of the ports are configured to be members of one CA reset group on the initial setting. This function can create a CA reset group with only specific ports or change the member ports of an existing CA reset group when ports cannot be accessed.
The maximum number of CA reset groups is equal to the number of ports.

Caution

- If a host is unable to access the volumes in a port, this function releases the volumes reserved by the inaccessible port to the ports in the specified CA reset group, without affecting other ports.
- When a port is shared by multiple servers using the host affinity function, only volumes that can be released under the instructions from the servers are included in the LUN group, with a host affinity configured with the target server.
- One port cannot be registered in multiple CA reset groups.
- Only the ports with the "CA" or "CA/RA" port mode can be registered in a CA reset group.

Note

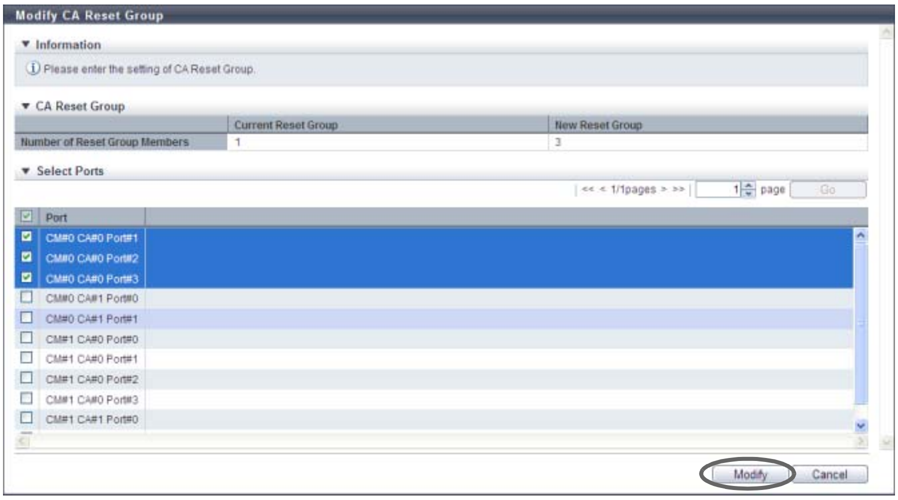
- If some ports have been removed from the modification target CA reset group, a different group is created using those ports. For instance, if ports (Port#2 and Port#3) have been removed from the modification target CA reset group A (Port#0, Port#1, Port#2 and Port#3), a CA reset group A (Port#0 and Port#1) and a CA reset group B (Port#2 and Port#3) are created after modification. The minimum number of ports per CA reset group is one port.
- CA reset groups are required for certain servers to switch clusters correctly.
- Ports with different CA types can be members of the same CA reset group.
- For more details on which servers are required to configure the CA reset group, refer to "User's Guide -Server Connection-" for each OS type.

The procedure to modify a reset group is as follows:

Procedure

1 Select the CA reset group to be modified, and click [Modify Reset Group] in [Action].

2 Modify the member ports in a CA reset group, and click the [Modify] button.



Note

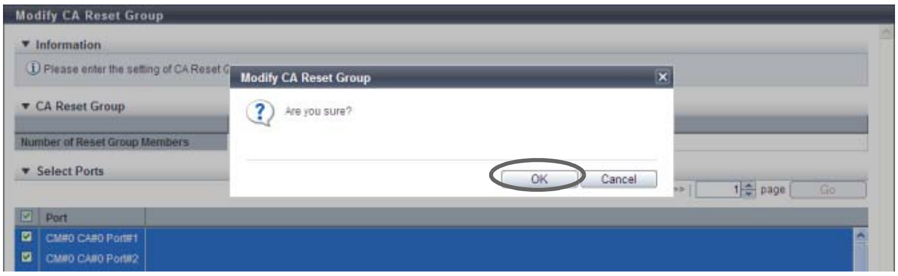
Checkboxes of the member ports of the specified CA reset group are selected. Select the checkbox of the port to be added in the corresponding CA reset group. Clear the checkbox of the port to be deleted from the corresponding CA reset group.

→ A confirmation screen appears.

Caution

- One port cannot be registered in multiple CA reset groups. If a member port of another CA reset group has been selected, the member port is deleted from the existing CA reset group.
- If the selected "Port" does not exist, an error screen appears.

3 Click the [OK] button.



→ Modification of the CA reset group starts.

4 Click the [Done] button to return to the [CA Reset Group] screen.

End of procedure

9.2.7 Host-LU QoS Management

Host-LU QoS management provides the following functions:

- Enable/Disable Host-LU QoS
- Set Host-LU QoS
- Release Host-LU QoS
- Start Host-LU QoS Performance Monitoring
- Stop Host-LU QoS Performance Monitoring
- Set FC/FCoE Host QoS
- Set iSCSI Host QoS
- Set SAS Host QoS
- Set FC Port QoS
- Set iSCSI Port QoS
- Set SAS Port QoS
- Set FCoE Port QoS
- Add LU QoS Group
- Delete LU QoS Group
- Modify LU QoS Group

9.2.7.1 Enable/Disable Host-LU QoS

This function enables or disables the Host-LU QoS.

Note

- If the Host-LU QoS is changed from "Enable" to "Disable", the configured bandwidth limit is saved.
- If the Host-LU QoS is changed from "Disable" to "Enable", the Host-LU QoS operates within the saved bandwidth limit.
- If the bandwidth limit is not specified when the Host-LU QoS is changed to "Enable", "Unlimited" is applied to all the bandwidth limit settings for hosts, ports, and LUNs (the setting value is not changed).

When enabling the Host-LU QoS

The procedure to enable the Host-LU QoS is as follows:

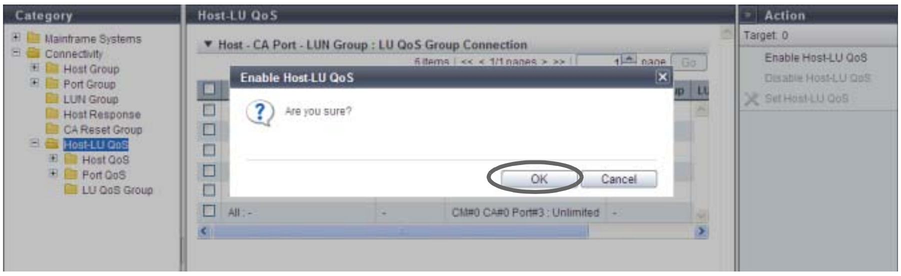
Procedure

1 Click [Enable Host-LU QoS] in [Action].

→ A confirmation screen appears.

> **Caution**
>
> If the Host-LU QoS has already been enabled, [Enable Host-LU QoS] cannot be clicked.

2 Click the [OK] button.



→ The Host-LU QoS is enabled.

3 Click the [Done] button to return to the [Host-LU QoS] screen.

End of procedure

When disabling the Host-LU QoS

The procedure to disable the Host-LU QoS is as follows:

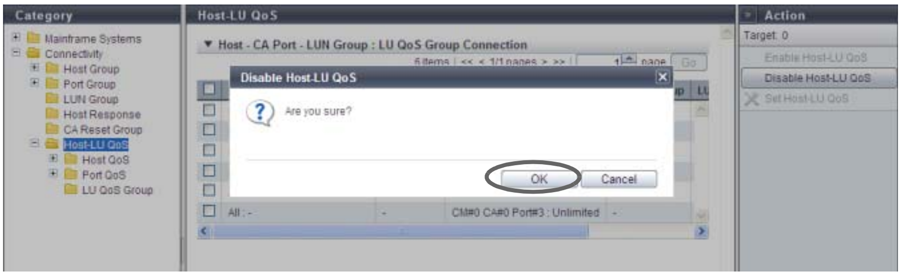
Procedure

1 Click [Disable Host-LU QoS] in [Action].

→ A confirmation screen appears.

> **Caution**
>
> If the Host-LU QoS has already been disabled, [Disable Host-LU QoS] cannot be clicked.

2 Click the [OK] button.



→ The Host-LU QoS is disabled.

3 Click the [Done] button to return to the [Host-LU QoS] screen.

End of procedure

9.2.7.2 Set Host-LU QoS

This function assigns a LU QoS group to a "Host - CA Port - LUN Group" on which the host affinity setting has been configured. A bandwidth limit (the maximum performance limit) is configured to each host LUN in a LU QoS group.

Caution

- This function can be used, irrespective of whether the Host-LU QoS has been enabled or disabled. However, if the Host-LU QoS has been disabled, the host starts operating within the configured bandwidth limit after the Host-LU QoS is enabled.
- When assigning a LU QoS group to the "Host - CA Port - LUN Group", check the number of host LUNs and the current usage for the LUN group, and assign the appropriate LU QoS group.

Note

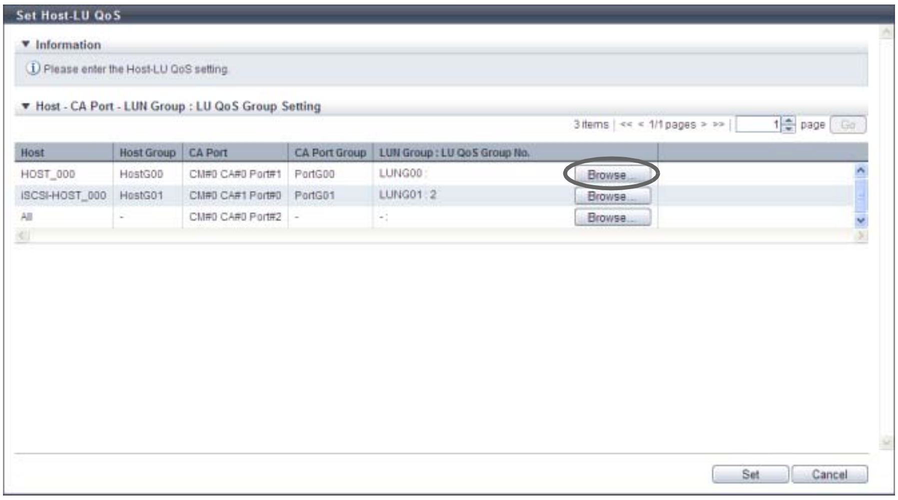
- Before executing the [Set Host-LU QoS] function, configure a bandwidth limit on each host LUN. Refer to "9.2.7.13 Add LU QoS Group" (page 616) for details.
- When checking the number of host LUNs and the bandwidth limit of each LUN in the LU QoS group, refer to "9.2.7.15 Modify LU QoS Group" (page 618).
- Configure a bandwidth limit on each host. Refer to the following sections for details:
  - "9.2.7.6 Set FC/FCoE Host QoS" (page 605)
  - "9.2.7.7 Set iSCSI Host QoS" (page 607)
  - "9.2.7.8 Set SAS Host QoS" (page 608)
- Configure the CA port bandwidth limit on each CA port. Refer to the following sections for details:
  - "9.2.7.9 Set FC Port QoS" (page 610)
  - "9.2.7.10 Set iSCSI Port QoS" (page 611)
  - "9.2.7.11 Set SAS Port QoS" (page 613)
  - "9.2.7.12 Set FCoE Port QoS" (page 614)

The procedure to set the Host-LU QoS is as follows:

Procedure

1 Select the "Host - CA Port - LUN Group" to set the Host-LU QoS (multiple selections can be made) and click [Set Host-LU QoS] in [Action].

2 Click the [Browse...] button in the "LUN Group: LUN QoS Group No." field.



→ The [Select LU QoS Group] screen is displayed.

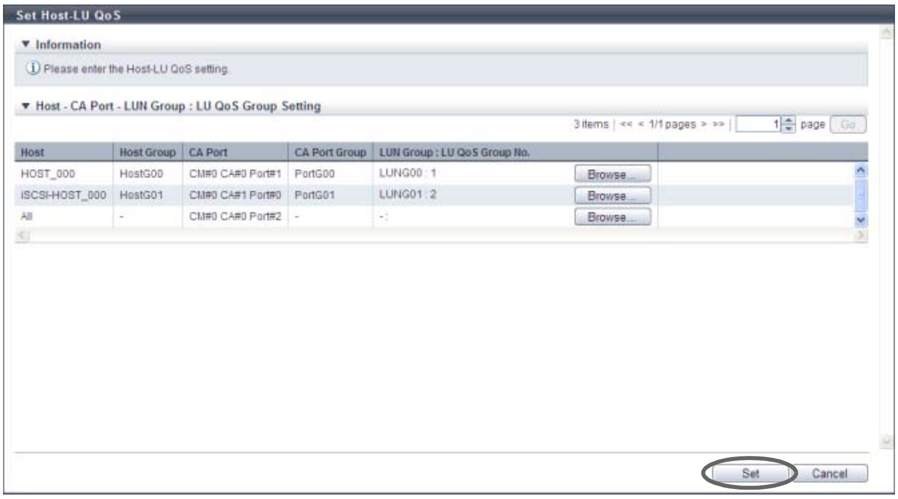
3 Select a LUN QoS group, and click the [OK] button.

- Select LU QoS Group
  Select the radio button for the LU QoS group number to assign to a "Host - CA Port - LUN Group".



→ The display returns to the initial screen.

4 After confirming the association between "Host", "CA Port", and "LUN Group : LU QoS Group No.", click the [Set] button.



→ A confirmation screen appears.

5 Click the [OK] button.



→ The Host-LU QoS setting starts.

6 Click the [Done] button to return to the [Host-LU QoS] screen.

End of procedure

9.2.7.3 Release Host-LU QoS

This function releases the LU QoS groups that are assigned to a "Host - CA Port - LUN Group" with host affinity settings.

Note

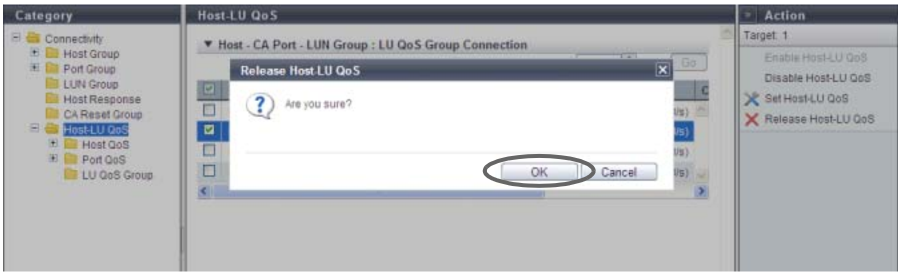
If a "Host - CA Port - LUN Group" for which a LU QoS group is not assigned is selected, the [Release Host-LU QoS] function cannot be used.

The procedure to release Host-LU QoS is as follows:

Procedure

1 Select the "Host - CA Port - LUN Group" for which the Host-LU QoS is to be released (multiple selections can be made) and click [Release Host-LU QoS] in [Action].
→ A confirmation screen appears.

2 Click the [OK] button.



→ Releasing of the Host-LU QoS starts.

3 Click the [Done] button to return to the [Host-LU QoS] screen.

End of procedure

9.2.7.4 Start Host-LU QoS Performance Monitoring

This function starts performance monitoring of Host-LU QoS.

Target ports for monitoring performance

- When this function is selected in the [Host-LU QoS] screen, performance monitoring of Host-LU QoS is started for the following ports:
  - All FC, iSCSI, SAS, and FCoE ports that are installed in the ETERNUS DX Disk storage system
  - Ports which port mode are "CA" or "CA/RA"
  - Ports without " Undefined" status or " Undefined (Error)" status
- When this function is selected in each [Port QoS] screen for FC, iSCSI, SAS, or FCoE, performance monitoring of Host-LU QoS is started for the following ports:
  - Ports that are selected in the [Port QoS] screen for each host interface (multiple selections can be made)

Caution

When this function is started after port selection, ports with different host interfaces cannot be selected at the same time.

Note

- This function can start performance monitoring regardless of whether the Host-LU QoS mode is enabled or disabled.
- Performance monitoring can be started even if other performance information is being obtained. If performance monitoring is restarted, the performance information that is already obtained is deleted and the collection of performance starts again. The start time is changed to the last time when performance monitoring was restarted.

The procedure to start the Host-LU QoS performance monitoring is as follows:

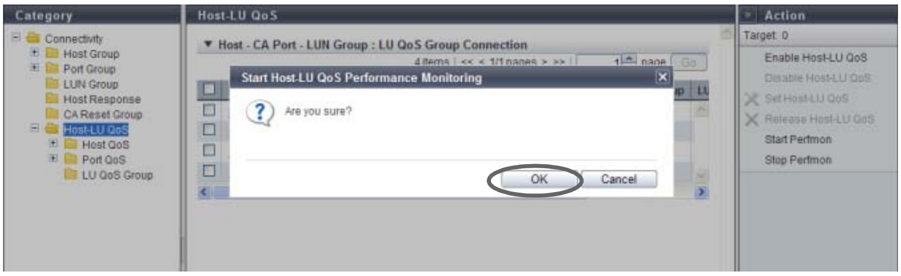
When this function is selected in the [Host-LU QoS] screen

Procedure

1 Click [Start Perfmon] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ Acquisition of Host-LU QoS performance information starts.

3 Click the [Done] button to return to the [Host-LU QoS] screen.

End of procedure

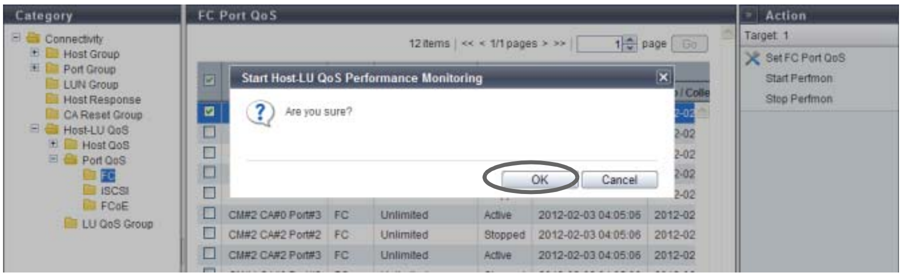
When this function is selected in the [Port QoS] screen for each host interface

Procedure

1 Select the port to start the Host-LU QoS performance monitoring for (multiple selections can be made) and click [Start Perfmon] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ Acquisition of Host-LU QoS performance information starts.

3 Click the [Done] button to return to the screen when starting this function in Step 1.

End of procedure

9.2.7.5 Stop Host-LU QoS Performance Monitoring

This function starts performance monitoring of Host-LU QoS.

Caution

When this function is started after port selection, ports with different host interfaces cannot be selected at the same time.

Note

This function can stop performance monitoring regardless of whether the Host-LU QoS mode is enabled or disabled.

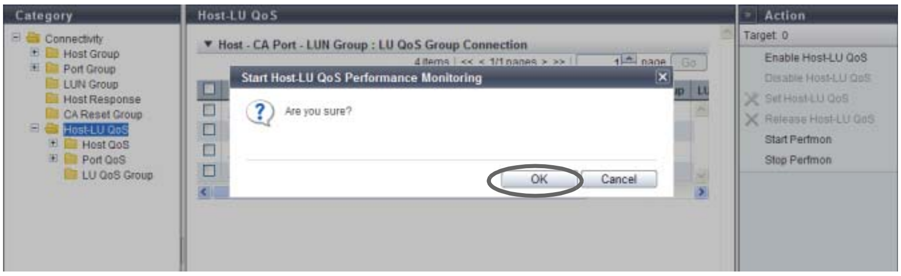
The procedure to stop the Host-LU QoS performance monitoring is as follows:

■ When this function is selected in the [Host-LU QoS] screen

Procedure

1 Click [Stop Perfmon] in [Action].
→ A confirmation screen appears.

2 Click the [OK] button.



→ Acquisition of Host-LU QoS performance information stops.

3 Click the [Done] button to return to the [Host-LU QoS] screen.

End of procedure

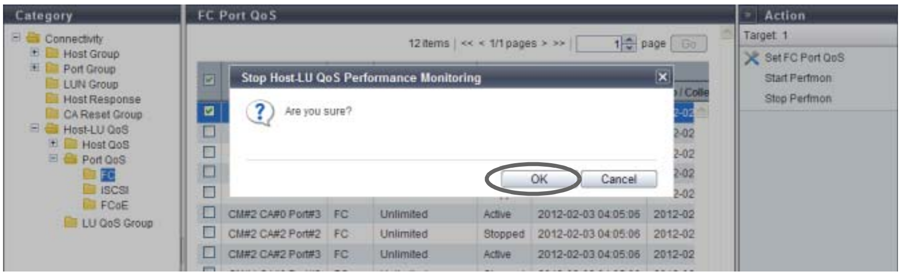
When this function is selected in the [Port QoS] screen for each host interface

Procedure

1 Select the port to stop the Host-LU QoS performance monitoring for (multiple selections can be made) and click [Stop Perfmon] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ Acquisition of Host-LU QoS performance information stops.

3 Click the [Done] button to return to the screen when starting this function in Step 1.

End of procedure

9.2.7.6 Set FC/FCoE Host QoS

This function configures the bandwidth limit (the maximum performance limit) of the FC/FCoE host.

Caution

This function can be used, irrespective of whether the Host-LU QoS has been enabled or disabled. However, if the Host-LU QoS has been disabled, the host starts operating within the configured bandwidth limit after the Host-LU QoS is enabled.

Note

- Configure the port bandwidth limit on each port. Refer to the following sections for details:
  - "9.2.7.9 Set FC Port QoS" (page 610)
  - "9.2.7.10 Set iSCSI Port QoS" (page 611)
  - "9.2.7.11 Set SAS Port QoS" (page 613)
  - "9.2.7.12 Set FCoE Port QoS" (page 614)
- The LUN bandwidth limit can be configured in the LU QoS group. Refer to "9.2.7.2 Set Host-LU QoS" (page 599) for details.

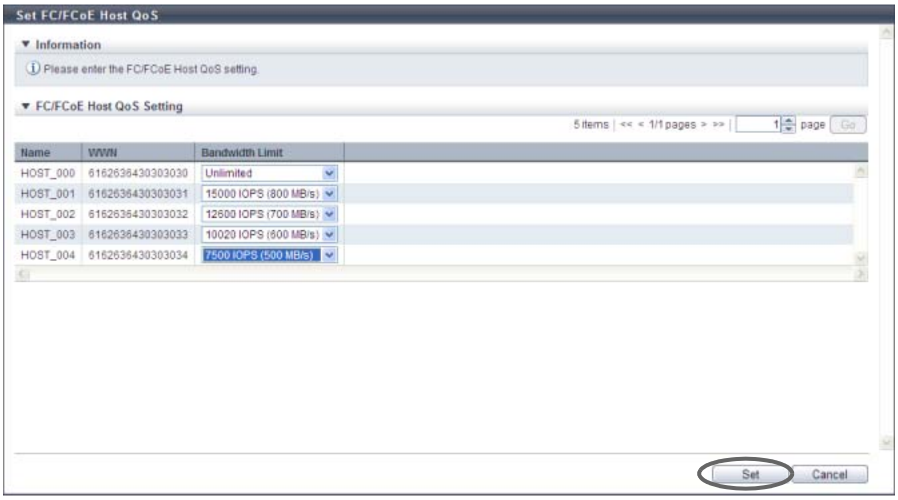
The procedure to set the FC/FCoE host QoS is as follows:

Procedure

1 Select the FC/FCoE host to set the bandwidth limit (multiple selections can be made), and click [Set FC/FCoE Host QoS] in [Action].

2 Select the FC/FCoE host bandwidth limit, and click the [Set] button.

- Bandwidth Limit
  Select the maximum performance in IOPS (throughput value). If the bandwidth limit is not applied, select "Unlimited".



→ A confirmation screen appears.

3 Click the [OK] button.



→ The FC/FCoE host QoS setting starts.

4 Click the [Done] button to return to the [FC/FCoE Host QoS] screen.

End of procedure

9.2.7.7 Set iSCSI Host QoS

This function configures the bandwidth limit (the maximum performance limit) of the iSCSI host.

Caution

This function can be used, irrespective of whether the Host-LU QoS has been enabled or disabled. However, if the Host-LU QoS has been disabled, the host starts operating within the configured bandwidth limit after the Host-LU QoS is enabled.

Note

- Configure the port bandwidth limit on each port. Refer to the following sections for details:
  - "9.2.7.9 Set FC Port QoS" (page 610)
  - "9.2.7.10 Set iSCSI Port QoS" (page 611)
  - "9.2.7.11 Set SAS Port QoS" (page 613)
  - "9.2.7.12 Set FCoE Port QoS" (page 614)
- The LUN bandwidth limit can be configured in the LU QoS group. Refer to "9.2.7.2 Set Host-LU QoS" (page 599) for details.

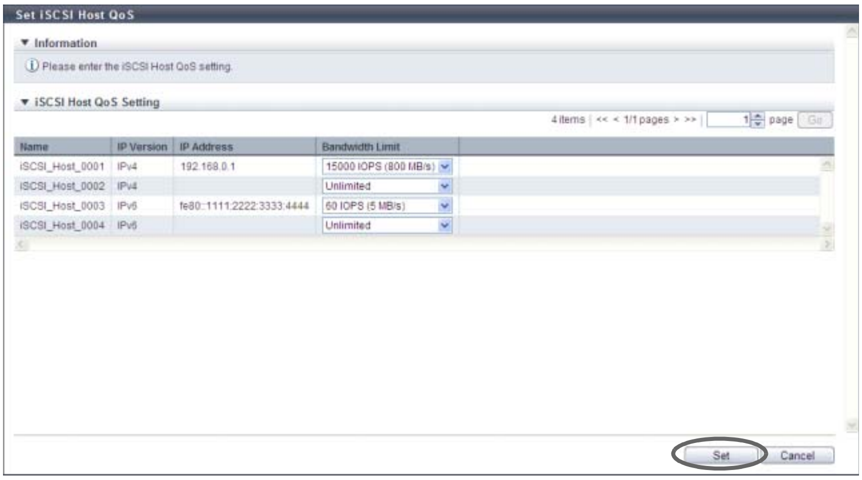
The procedure to set the iSCSI host QoS is as follows:

Procedure

1 Select the iSCSI host to set the bandwidth limit (multiple selections can be made), and click [Set iSCSI Host QoS] in [Action].

2 Select the iSCSI host bandwidth limit, and click the [Set] button.

- Bandwidth Limit
  Select the maximum performance in IOPS (throughput value). If the bandwidth limit is not applied, select "Unlimited".



→ A confirmation screen appears.

3 Click the [OK] button.



→ The iSCSI host QoS setting starts.

4 Click the [Done] button to return to the [iSCSI Host QoS] screen.

End of procedure

9.2.7.8 Set SAS Host QoS

This function configures the bandwidth limit (the maximum performance limit) of the SAS host.

Caution

This function can be used, irrespective of whether the Host-LU QoS has been enabled or disabled. However, if the Host-LU QoS has been disabled, the host starts operating within the configured bandwidth limit after the Host-LU QoS is enabled.

Note

- Configure the port bandwidth limit on each port. Refer to the following sections for details:
  - "9.2.7.9 Set FC Port QoS" (page 610)
  - "9.2.7.10 Set iSCSI Port QoS" (page 611)
  - "9.2.7.11 Set SAS Port QoS" (page 613)
  - "9.2.7.12 Set FCoE Port QoS" (page 614)
- The LUN bandwidth limit can be configured in the LU QoS group. Refer to "9.2.7.2 Set Host-LU QoS" (page 599) for details.

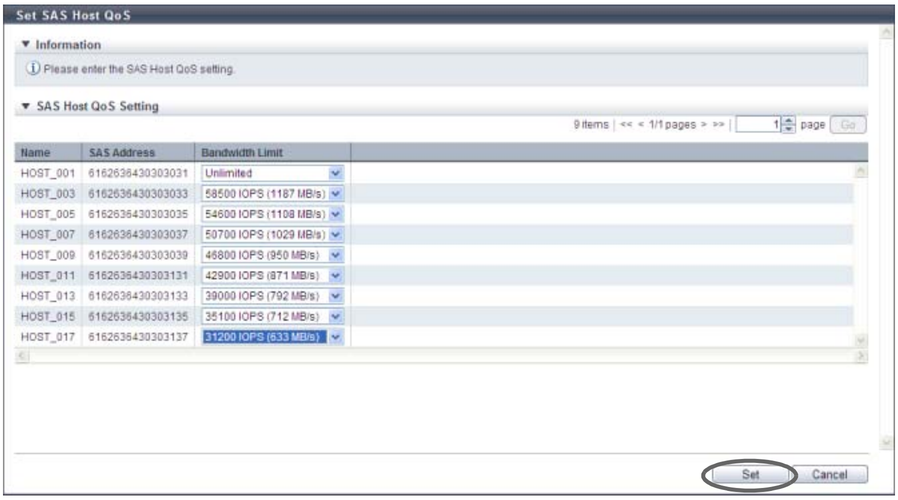
The procedure to set the SAS host QoS is as follows:

Procedure

1 Select the SAS host to set the bandwidth limit (multiple selections can be made), and click [Set SAS Host QoS] in [Action].

2 Select the SAS host bandwidth limit, and click the [Set] button.

- Bandwidth Limit
  Select the maximum performance in IOPS (throughput value). If the bandwidth limit is not applied, select "Unlimited".



→ A confirmation screen appears.

3 Click the [OK] button.



→ The SAS host QoS setting starts.

4 Click the [Done] button to return to the [SAS Host QoS] screen.

End of procedure

9.2.7.9 Set FC Port QoS

This function specifies the bandwidth limit (maximum performance limit) for the FC port.

Caution

- The bandwidth limit can be configured only for the ports in the port mode of "CA" or "CA/RA". For the ports in the port mode of "RA" and "Initiator", the bandwidth limit cannot be specified.
- If the port mode has been changed from "CA" or "CA/RA" to "RA" or "Initiator", the bandwidth limit returns to the default value.
- This function can be used, irrespective of whether the Host-LU QoS is enabled or disabled. However, if the Host-LU QoS has been disabled, the host starts operating within the configured bandwidth limit after the Host-LU QoS is enabled.

Note

- Configure the port bandwidth limit on each host. Refer to the following sections for details:
  - "9.2.7.6 Set FC/FCoE Host QoS" (page 605)
  - "9.2.7.7 Set iSCSI Host QoS" (page 607)
  - "9.2.7.8 Set SAS Host QoS" (page 608)
- The LUN bandwidth limit can be configured in the LU QoS group. Refer to "9.2.7.2 Set Host-LU QoS" (page 599) for details.

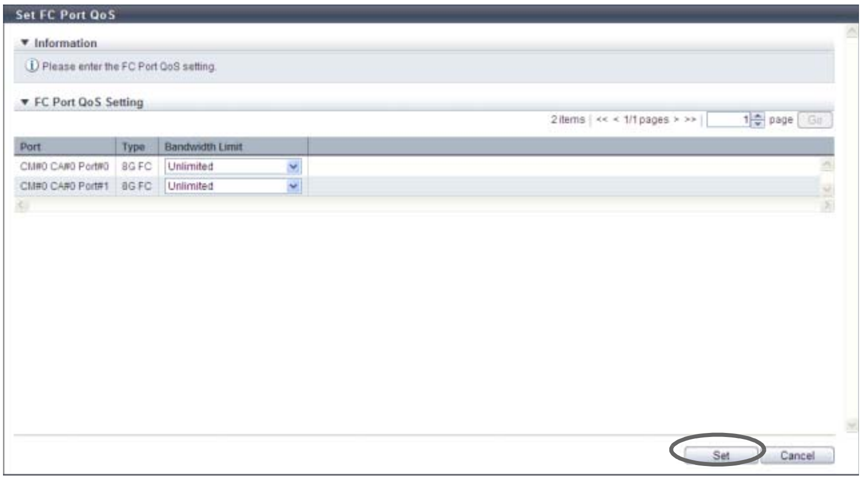
The procedure to set the FC port QoS is as follows:

Procedure

1 Select the FC port to set the bandwidth limit (multiple selections can be made), and click [Set FC Port QoS] in [Action].

2 Select the FC port bandwidth limit, and click the [Set] button.

- Bandwidth Limit
  Select the maximum performance in IOPS (throughput value). If the bandwidth limit is not applied, select "Unlimited".



→ A confirmation screen appears.

3 Click the [OK] button.



→ The FC port QoS setting starts.

4 Click the [Done] button to return to the [FC Port QoS] screen.

End of procedure

9.2.7.10 Set iSCSI Port QoS

This function specifies the bandwidth limit (maximum performance limit) for the iSCSI port.

Caution

- The bandwidth limit can be configured only for the ports in the port mode of "CA" or "CA/RA". For the ports in the port mode of "RA", the bandwidth limit cannot be specified.
- If the port mode has been changed from "CA" or "CA/RA" to "RA", the bandwidth limit returns to the default value.
- This function can be used, irrespective of whether the Host-LU QoS is enabled or disabled. However, if the Host-LU QoS has been disabled, the host starts operating within the configured bandwidth limit after the Host-LU QoS is enabled.

Note

- Configure the port bandwidth limit on each host. Refer to the following sections for details:
  - "9.2.7.6 Set FC/FCoE Host QoS" (page 605)
  - "9.2.7.7 Set iSCSI Host QoS" (page 607)
  - "9.2.7.8 Set SAS Host QoS" (page 608)
- The LUN bandwidth limit can be configured in the LU QoS group. Refer to "9.2.7.2 Set Host-LU QoS" (page 599) for details.

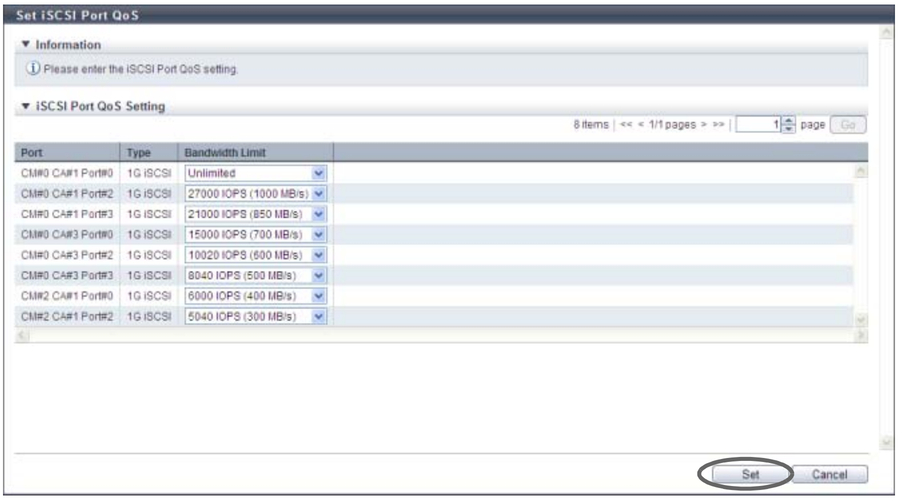
The procedure to set the iSCSI port QoS is as follows:

Procedure

1 Select the iSCSI port to set the bandwidth limit (multiple selections can be made), and click [Set iSCSI Port QoS] in [Action].

2 Select the iSCSI port bandwidth limit, and click the [Set] button.

- Bandwidth Limit
  Select the maximum performance in IOPS (throughput value). If the bandwidth limit is not applied, select "Unlimited".



→ A confirmation screen appears.

3 Click the [OK] button.



→ The iSCSI port QoS setting starts.

4 Click the [Done] button to return to the [iSCSI Port QoS] screen.

End of procedure

9.2.7.11 Set SAS Port QoS

This function specifies the bandwidth limit (maximum performance limit) for the SAS port.

Caution

This function can be used, irrespective of whether the Host-LU QoS is enabled or disabled. However, if the Host-LU QoS has been disabled, the host starts operating within the configured bandwidth limit after the Host-LU QoS is enabled.

Note

- Configure the port bandwidth limit on each host. Refer to the following sections for details:
  - "9.2.7.6 Set FC/FCoE Host QoS" (page 605)
  - "9.2.7.7 Set iSCSI Host QoS" (page 607)
  - "9.2.7.8 Set SAS Host QoS" (page 608)
- The LUN bandwidth limit can be configured in the LU QoS group. Refer to "9.2.7.2 Set Host-LU QoS" (page 599) for details.

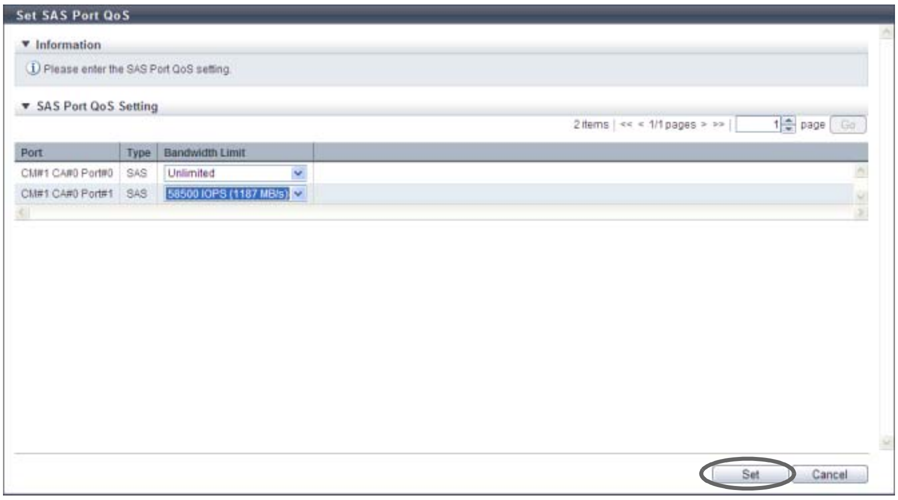
The procedure to set the SAS port QoS is as follows:

Procedure

1 Select the SAS port to set the bandwidth limit (multiple selections can be made), and click [Set SAS Port QoS] in [Action].

2 Select the SAS port bandwidth limit, and click the [Set] button.

- Bandwidth Limit
  Select the maximum performance in IOPS (throughput value). If the bandwidth limit is not applied, select "Unlimited".



→ A confirmation screen appears.

3 Click the [OK] button.



→ The SAS port QoS setting starts.

4 Click the [Done] button to return to the [SAS Port QoS] screen.

End of procedure

9.2.7.12 Set FCoE Port QoS

This function specifies the bandwidth limit (maximum performance limit) for the FCoE port.

Caution

This function can be used, irrespective of whether the Host-LU QoS is enabled or disabled. However, if the Host-LU QoS has been disabled, the host starts operating within the configured bandwidth limit after the Host-LU QoS is enabled.

Note

- Configure the port bandwidth limit on each host. Refer to the following sections for details:
  - "9.2.7.6 Set FC/FCoE Host QoS" (page 605)
  - "9.2.7.7 Set iSCSI Host QoS" (page 607)
  - "9.2.7.8 Set SAS Host QoS" (page 608)
- The LUN bandwidth limit can be configured in the LU QoS group. Refer to "9.2.7.2 Set Host-LU QoS" (page 599) for details.

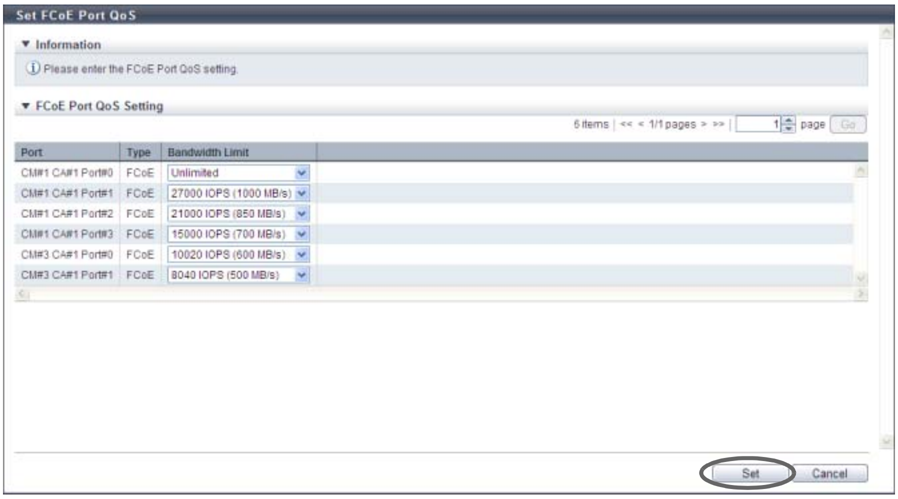
The procedure to set the FCoE port QoS is as follows:

Procedure

1 Select the FCoE port to set the bandwidth limit (multiple selections can be made), and click [Set FCoE Port QoS] in [Action].

2 Select the FCoE port bandwidth limit, and click the [Set] button.

- Bandwidth Limit
  Select the maximum performance in IOPS (throughput value). If the bandwidth limit is not applied, select "Unlimited".



→ A confirmation screen appears.

3 Click the [OK] button.



→ The FCoE port QoS setting starts.

4 Click the [Done] button to return to the [FCoE Port QoS] screen.

End of procedure

9.2.7.13 Add LU QoS Group

This function adds LU QoS groups with bandwidth limit (the maximum performance limit) settings to each host LUN.

Caution

- Use one LU QoS group number per 512 Host LUNs as an internal resource. When there are LU QoS groups with a bandwidth limit other than "Unlimited" from Host LUN#512 onward, the maximum number of QoS groups cannot be created.
- Host-LU QoS does not support from LUN#1024 onward. Even if volumes are mapped from LUN#1024 onward, only up to 1024 LUNs (LUN#0 - LUN#1023) can be specified for the bandwidth limit.

Note

- This function can be used, irrespective of whether the Host-LU QoS is enabled or disabled.
- By assigning an LU QoS group to a LUN group with the host affinity settings, the bandwidth limit can be configured for each LUN. Refer to "9.2.7.2 Set Host-LU QoS" (page 599) for details.

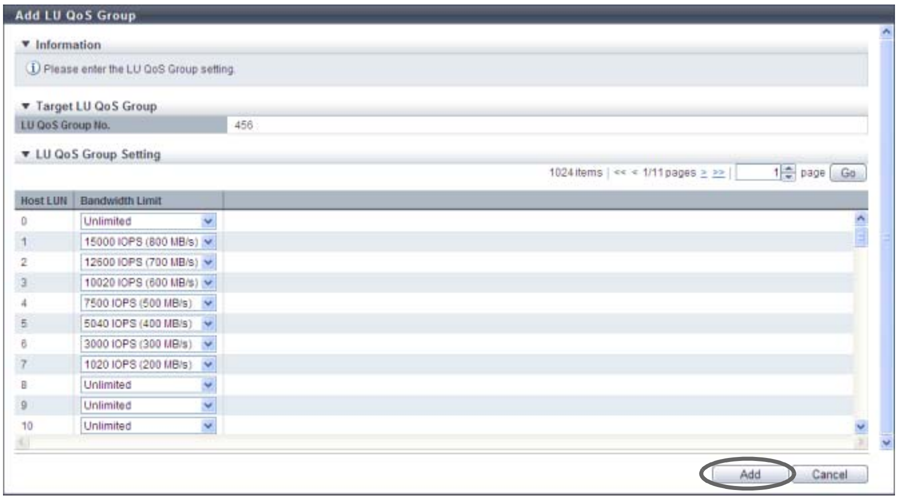
The procedure to set the bandwidth limit for host LUN is as follows:

Procedure

1 Click [Add LU QoS Group] in [Action].

2 Select a host LUN bandwidth limit, and click the [Add] button.

- Bandwidth Limit
  Select the maximum performance in IOPS (throughput value). If the bandwidth limit is not applied, select "Unlimited".



→ A confirmation screen appears.

3 Click the [OK] button.



→ Addition of LU QoS group starts.

4 Click the [Done] button to return to the [LU QoS Group] screen.

End of procedure

9.2.7.14 Delete LU QoS Group

This function deletes LU QoS groups.

Caution

An LU QoS group in the "Active" status cannot be deleted.

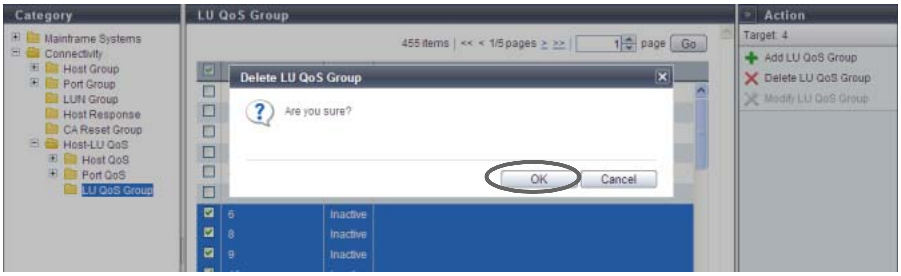
The procedure to delete LU QoS groups is as follows:

Procedure

1 Select the LU QoS group that is to be deleted (multiple selections can be made) and click [Delete LU QoS Group] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ Deletion of LU QoS group starts.

Caution

If the selected LU QoS group does not exist, an error screen appears.

3 Click the [Done] button to return to the [LU QoS Group] screen.

End of procedure

9.2.7.15 Modify LU QoS Group

This function changes the bandwidth limit (the maximum performance limit) settings of each host LUN.

Caution

- Use one LU QoS group number per 512 Host LUNs as an internal resource. When there are LU QoS groups with a bandwidth limit other than "Unlimited" from Host LUN#512 onward, the maximum number of QoS groups cannot be created.
- Host-LU QoS does not support from LUN#1024 onward. Even if volumes are mapped from LUN#1024 onward, only up to 1024 LUNs (LUN#0 - LUN#1023) can be specified for the bandwidth limit.

Note

- This function can be used, irrespective of whether the Host-LU QoS is enabled or disabled.
- By assigning an LU QoS group to a LUN group with the host affinity settings, the bandwidth limit can be configured for each LUN. Refer to "9.2.7.2 Set Host-LU QoS" (page 599) for details.

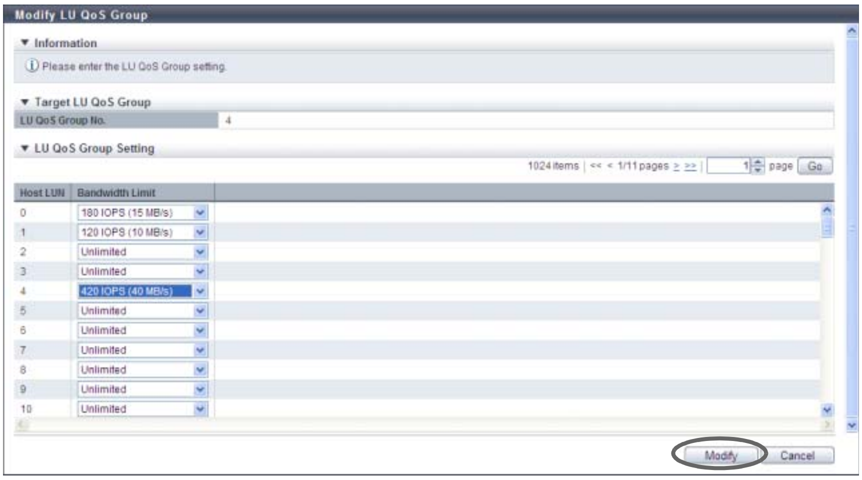
The procedure to change the bandwidth limit for host LUN is as follows:

Procedure

1 Select the LU QoS group to modify the bandwidth limit, and click [Modify LU QoS Group] in [Action].

2 Select a host LUN bandwidth limit, and click the [Modify] button.

- Bandwidth Limit
  Select the maximum performance in IOPS (throughput value). If the bandwidth limit is not applied, select "Unlimited".



→ A confirmation screen appears.

3 Click the [OK] button.



→ Modification of LU QoS group setting starts.

4 Click the [Done] button to return to the [LU QoS Group] screen.

End of procedure

Chapter 10
Component Management

This chapter describes component management.

10.1 Component Status

Component status displays the status information of volumes.
Component status screens can be displayed by clicking the following categories:

Component status screen	Category
Storage (Basic Information)	Storage system name
Controller Enclosure	Controller Enclosure
Controller Module	Controller Module
Controller Module (Performance)	Performance
All Channel Adapters	Channel Adapters
Channel Adapter Ports (Performance)	Performance
Frontend Router	Frontend Router
Backend Router	Backend Router
Service Controller	Service Controller
Power Supply Unit (CE)	Power Supply Unit
Battery	Battery
FAN Unit	FAN Unit
Operation Panel	Operation Panel
Drive Enclosure	Drive Enclosure
I/O Module	I/O Module
Port Error Statistics	Error Statistics
Power Supply Unit (DE)	Power Supply Unit
Disks	Disks
Disks (Performance)	Performance
Disk Error Statistics	Error Statistics

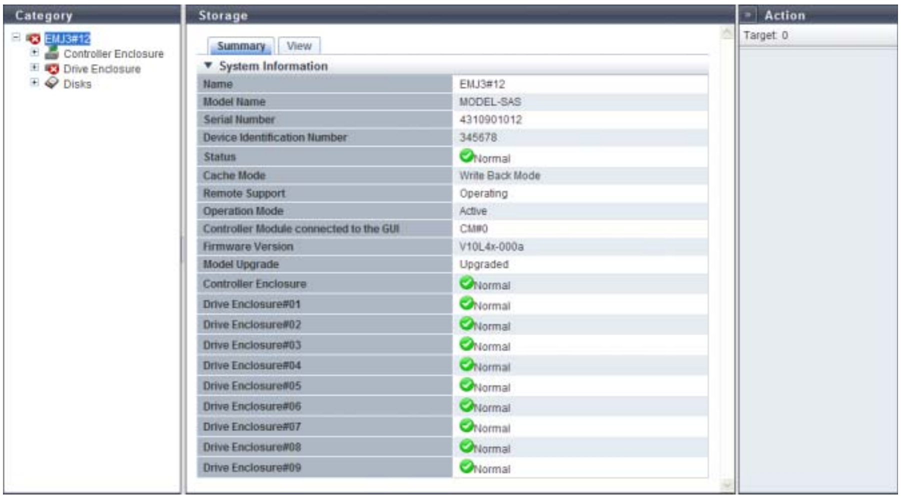
Detailed information of the components can be displayed from the following screens:

- Controller Module Detail
- Channel Adapter Detail
- Frontend Router Detail
- Backend Router Detail
- BRT Expander Detail
- Service Controller Detail
- PSU/CPSU (CE) Detail
- Battery Backup Unit Detail
- FAN Unit Detail
- Drive Enclosure Detail
- I/O Module Detail
- Power Supply Unit (DE) Detail
- Disks Detail
- QSFP Cable Detail
- Boot and Utility Device Detail
- CM Module Management Controller Detail
- Port Detail

10.1.1 Storage (Basic Information)

The general information for the ETERNUS DX Disk storage system is displayed.

Summary



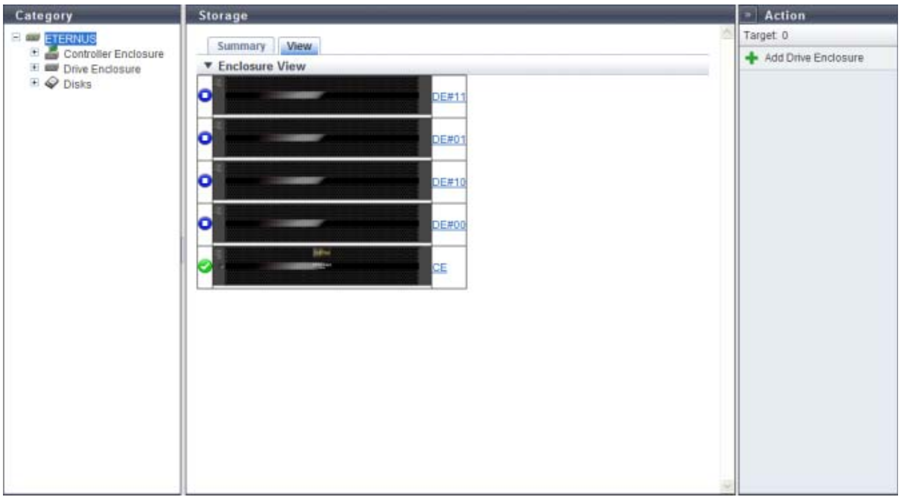
The following items are displayed in the Main area:

- Name
  The name of the ETERNUS DX Disk storage system is displayed.
- Model Name
  The model name of the ETERNUS DX Disk storage system is displayed.
- Serial Number
  The serial number of the ETERNUS DX Disk storage system is displayed.
- Device Identification Number
  The identification number of the ETERNUS DX Disk storage system is displayed.
- Status
  The general status of the ETERNUS DX Disk storage system is displayed. Refer to "B.1 Device General Status" (page 972) for details.
- Cache Mode
  The current status and the factor of the cache are displayed. The normal status is "Write Back Mode". When Write Through status is displayed, the factors that caused Write Through status are also displayed in brackets. Refer to the description for "Cache Mode" in "1.5.1 Overview" (page 21) for details about each status.
  - Write Back
  - Write Through (Pinned Data)
  - Write Through (Battery)
  - Write Through (Maintenance)
  - Write Through (1CM)

- Battery
  The battery charge level is displayed.
  When the battery charge level is 90% or more, "Full Charge" is displayed. When the battery charge level is less than 90%, "xx%" is displayed. This item is displayed only when using the ETERNUS DX410 S2/DX440 S2 or the ETERNUS DX8100 S2/DX8700 S2.
- Remote Support
  The Remote Support (REMCS) status is displayed.
  - Operating
    The Remote Support is operating.
  - Maintenance in Progress
    The ETERNUS DX Disk storage system is under maintenance.
  - Stopped
    The Remote Support is stopped.
  - "-" (hyphen)
    The Remote Support is not configured.
- Operation Mode
  The operation mode is displayed.
  - Active
    The ETERNUS DX Disk storage system is operating.
  - Maintenance
    The ETERNUS DX Disk storage system is under maintenance.
- Controller Module connected to the GUI
  The CM that is connected to GUI is displayed.
- Firmware Version
  The current controller firmware version is displayed.
- Model Upgrade
  Whether the model upgrade is possible or not is displayed. When this item is not displayed, the model upgrade is not possible.
  - Not Upgraded
    A model upgrade has not been performed yet.
  - Upgraded
    A model upgrade has been performed.
- Controller Enclosure
  The status of the Controller Enclosure (CE) is displayed. Refer to "B.5 Component Status" (page 977) for details. This item is displayed only when using the ETERNUS DX80 S2/DX90 S2, the ETERNUS DX410 S2/DX440 S2, or the ETERNUS DX8100 S2.
- Drive Enclosure#xx
  The status of the drive enclosure (DE) is displayed. "#xx" indicates the DE number. Refer to "B.5 Component Status" (page 977) for details. This item is displayed only when using the ETERNUS DX80 S2/DX90 S2, the ETERNUS DX410 S2/DX440 S2, or the ETERNUS DX8100 S2.

View

This screen is displayed only when using the ETERNUS DX80 S2/DX90 S2, the ETERNUS DX410 S2/DX440 S2, or the ETERNUS DX8100 S2.



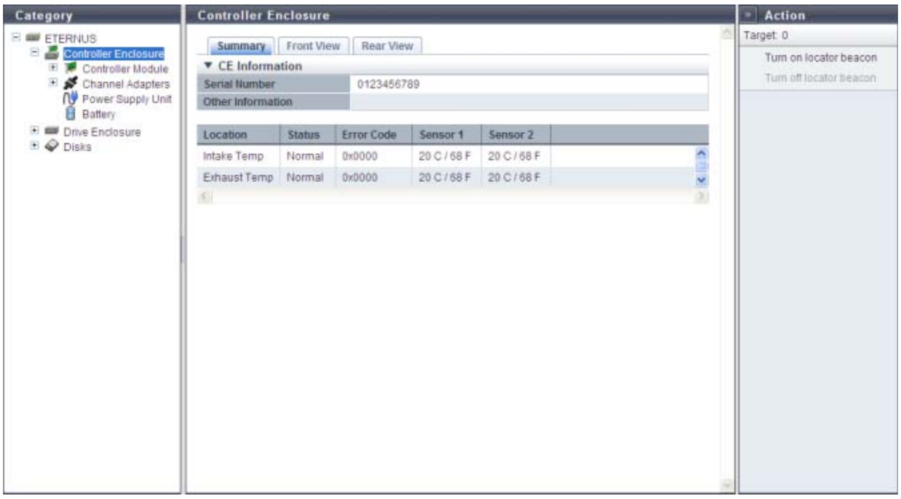
The following items are displayed in the Main area:

- Device image
  The front view of the enclosures that are installed in the ETERNUS DX Disk storage system is displayed. The enclosure statuses are displayed with icons. Refer to "B.5 Component Status" (page 977) for details.
  By clicking the [CE] link, the [Controller Enclosure] screen is displayed. Refer to "10.1.2 Controller Enclosure" (page 625) for display items.
  By clicking the [DE] link, the [Drive Enclosure] screen is displayed. Refer to "10.1.14 Drive Enclosure Detail" (page 669) for display items.

10.1.2 Controller Enclosure

Information of the CE is displayed.

■ Summary



The following items are displayed in the Main area:

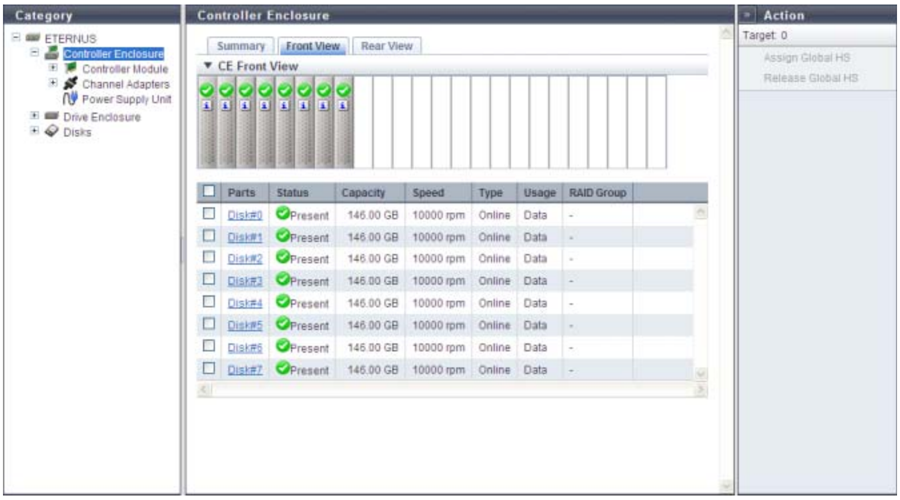
- Serial Number
  The serial number of the CE is displayed.
- Other Information
  Additional information for the CE is displayed.
- Location
  The installation location of the thermal sensor is displayed.
  - Intake Temp
  - Exhaust Temp
- Status
  The status of thermal sensor is displayed.
- Error Code
  The error code for thermal sensor is displayed.
- Sensor 1
  The internal temperature of CM#0 is displayed in Celsius (C) and in Fahrenheit (F).
  If the thermal information is not available due to problem such as a sensor failure, a "-" (hyphen) is displayed. This item is displayed only when using the ETERNUS DX80 S2/DX90 S2, the ETERNUS DX410 S2/DX440 S2, or the ETERNUS DX8100 S2.
- Sensor 2
  The internal temperature of CM#1 is displayed in Celsius (C) and in Fahrenheit (F).
  If the thermal information is not available due to problem such as a sensor failure, a "-" (hyphen) is displayed. This item is displayed only when using the ETERNUS DX80 S2/DX90 S2, the ETERNUS DX410 S2/DX440 S2, or the ETERNUS DX8100 S2.

- Sensor
  The temperature obtained from the SVC for which thermal monitoring is being performed is displayed in Celsius (C) and in Fahrenheit (F).
  If the thermal information is not available due to problem such as a sensor failure, a "-" (hyphen) is displayed. This item is displayed only when using the ETERNUS DX8700 S2.

Front View

The image that is displayed in this screen varies depending on the storage system model.

For ETERNUS DX80 S2/DX90 S2



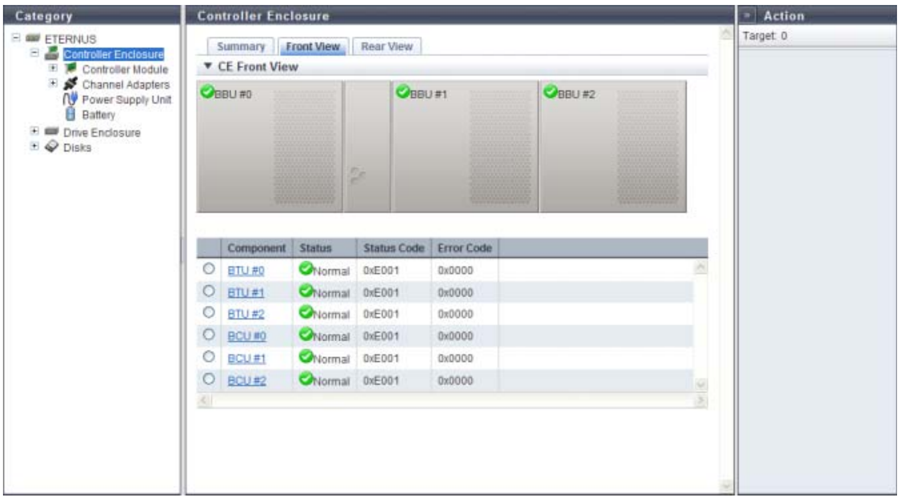
The following items are displayed in the Main area:

- Device image
  The front view of the CE that is installed in the ETERNUS DX Disk storage system is displayed.
  - For 2.5-inch models: 24 (24 drives are lined up horizontally)
  - For 3.5-inch models: 12 (3 drives are lined up vertically and 4 drives are lined up horizontally)
  - When no drives are installed: Blank

  The drive status is displayed with an icon. Refer to "B.5 Component Status" (page 977) for details.
  By clicking the drive image, the [Disks] screen is displayed. Refer to "10.1.17 Disks Detail" (page 675) for display items.
- Parts
  The drive number is displayed. By clicking the drive image, the [Disks] screen is displayed. Refer to "10.1.17 Disks Detail" (page 675) for display items.
- Status
  The drive status is displayed. Refer to "B.5.1 Drive Status" (page 978) for details.
- Capacity
  The capacity of the drive is displayed.
- Speed
  The drive speed is displayed. For SSDs, a "-" (hyphen) is displayed.
  - 15000 rpm
  - 10000 rpm
  - 7200 rpm

- Type
  The drive type is displayed.
  - For SAS disks: Online
  - For Nearline SAS disks: Nearline
  - For SSDs: SSD
  - For SEDs: SED
- Usage
  The usage of the drive is displayed.
  - For a drive that is used for user data or an unused drive: Data
  - For a drive that is registered as a Global Hot Spare: Global Hot Spare
  - For a drive that is registered as a Dedicated Hot Spare: Dedicated Hot Spare
- RAID Group
  If the drive is registered in a RAID group, the RAID group name to which the drive belongs is displayed.
  By clicking this item, the [RAID Group Detail] screen is displayed.

● For ETERNUS DX410 S2/DX440 S2 and ETERNUS DX8100 S2



The following items are displayed in the Main area:

- Device image
  The front view of the CE that is installed in the ETERNUS DX Disk storage system is displayed.
  The Battery Backup Unit (BBU) status is displayed with icons. Refer to "B.5 Component Status" (page 977) for details.
  By clicking the BBU, the [BTU] screen is displayed. Refer to "10.1.2.9 Battery" (page 642) for details.
- Component
  The Battery Unit (BTU) number or the Battery Charger Unit (BCU) number is displayed.
  By clicking the BTU number, the [BTU Detail] screen is displayed.
  By clicking the BCU number, the [BCU Detail] screen is displayed.
  Refer to "10.1.2.9 Battery" (page 642) for details.
- Status
  The BTU status or the BCU status is displayed. Refer to "B.5 Component Status" (page 977) for details.
- Status Code
  The status code of BTU or BCU is displayed.
- Error Code
  The error code of BTU or BCU is displayed.

● For ETERNUS DX8700 S2



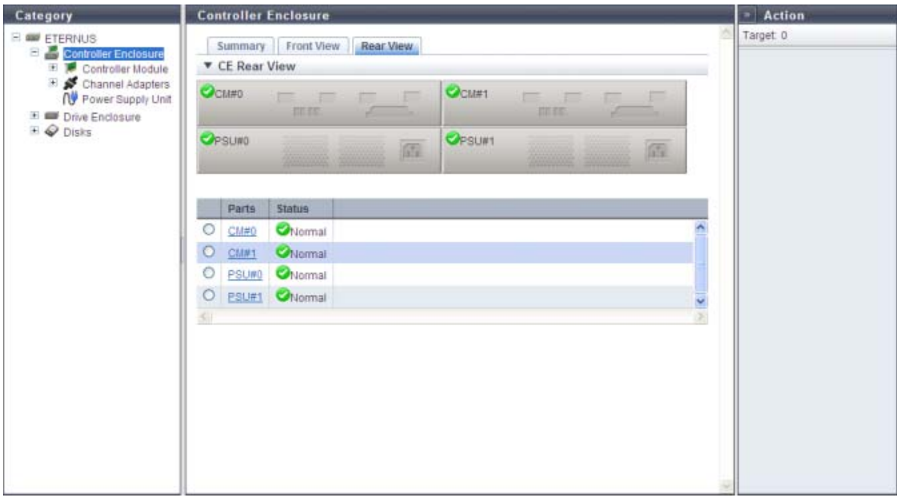
The following items are displayed in the Main area:

- Device image
  The front view of the CE that is installed in the ETERNUS DX Disk storage system is displayed.
  The statuses of the BBU, Controller Module (CM), Channel Adapter (CA), and Boot and Utility Device (BUD) are indicated by icons. Refer to "B.5 Component Status" (page 977) for details.
  By clicking the BBU number, the [Battery Backup Unit] screen is displayed. Refer to "10.1.12 Battery Backup Unit Detail" (page 666) for details.
  By clicking the CM number, the [Controller Module] screen is displayed. Refer to "10.1.5 Controller Module Detail" (page 652) for details.
  By clicking the CA number, the [Channel Adapter] screen is displayed. Refer to "10.1.6 Channel Adapter Detail" (page 655) for details.
  By clicking the BUD number, the [Boot and Utility Device] screen is displayed. Refer to "10.1.19 Boot and Utility Device Detail" (page 679) for details.
- Component
  The BBU number, CM number, CA number, or BUD number is displayed.
  By clicking the BBU number, the [Battery Backup Unit] screen is displayed. Refer to "10.1.2.9 Battery" (page 642) for details.
  By clicking the CM number, the [Controller Module] screen is displayed. Refer to "10.1.5 Controller Module Detail" (page 652) for details.
  By clicking the CA number, the [Channel Adapter] screen is displayed. Refer to "10.1.6 Channel Adapter Detail" (page 655) for details.
  By clicking the BUD number, the [Boot and Utility Device] screen is displayed. Refer to "10.1.19 Boot and Utility Device Detail" (page 679) for details.
- Status
  The status of BBU, CM, CA, or BUD is displayed. Refer to "B.5 Component Status" (page 977) for details.
- Status Code
  The status code of BBU, CM, CA, or BUD is displayed.
- Error Code
  The error code of BBU, CM, CA, or BUD is displayed.

Rear View

The image that is displayed in this screen varies depending on the storage system model.

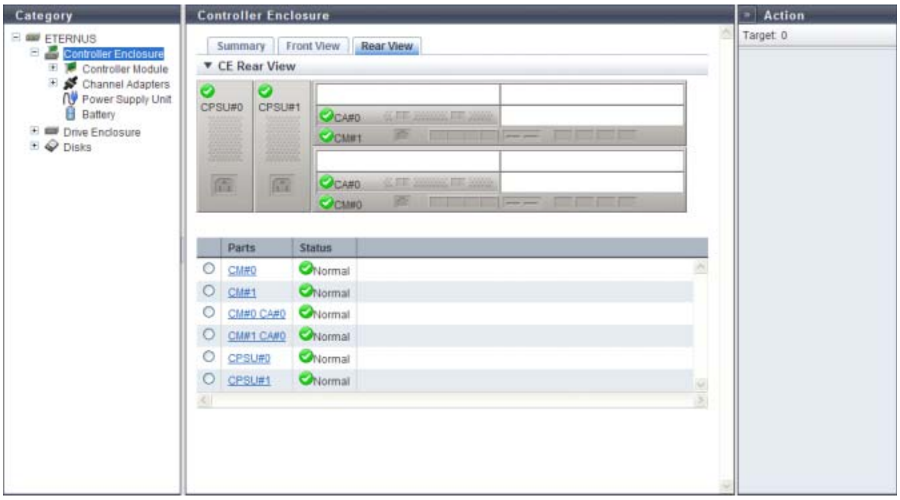
For ETERNUS DX80 S2/DX90 S2



The following items are displayed in the Main area:

- Device image
  The rear view of the CE that is installed in the ETERNUS DX Disk storage system is displayed.
  The CM status and the Power Supply Unit (PSU) status are displayed with icons.
  By clicking the CM number, the [Controller Module] screen is displayed. Refer to "10.1.5 Controller Module Detail" (page 652) for display items.
  By clicking the PSU number, the [Controller Enclosure Power Supply Unit] screen is displayed. Refer to "10.1.11 PSU/CPSU (CE) Detail" (page 664) for display items.
- Parts
  The CM number or the PSU number is displayed.
  By clicking the CM number, the [Controller Module] screen is displayed. Refer to "10.1.5 Controller Module Detail" (page 652) for display items.
  By clicking the PSU number, the [Controller Enclosure Power Supply Unit] screen is displayed. Refer to "10.1.11 PSU/CPSU (CE) Detail" (page 664) for display items.
- Status
  The CM status or the PSU status is displayed. Refer to "B.5 Component Status" (page 977) for details.

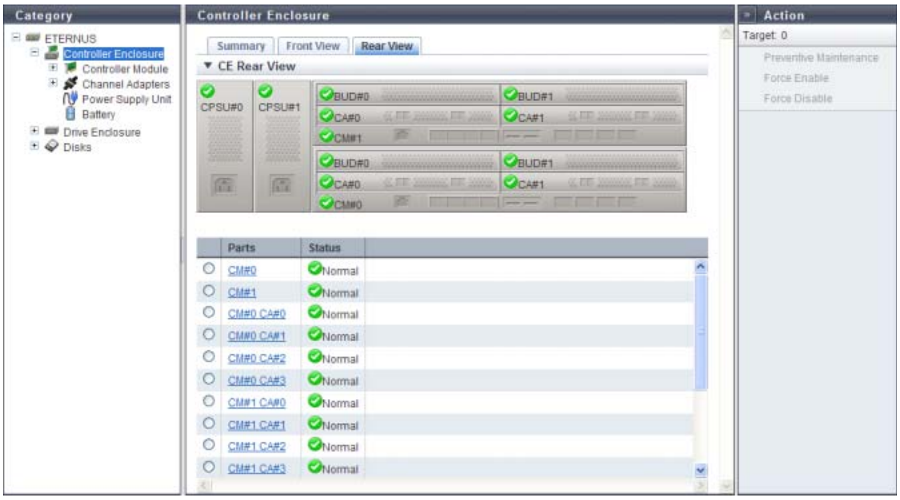
● For ETERNUS DX410 S2/DX440 S2



The following items are displayed in the Main area:

- Device image
  The rear view of the CE that is installed in the ETERNUS DX Disk storage system is displayed.
  The CM status, the CA status, and the Controller enclosure Power Supply Unit (CPSU) status are displayed with icons.
  By clicking the CM number, the [Controller Module] screen is displayed. Refer to "10.1.5 Controller Module Detail" (page 652) for display items.
  By clicking the CA number, the [Channel Adapter] screen is displayed. Refer to "10.1.6 Channel Adapter Detail" (page 655) for display items.
  By clicking the CPSU number, the [Controller Enclosure Power Supply Unit] screen is displayed. Refer to "10.1.11 PSU/CPSU (CE) Detail" (page 664) for display items.
- Parts
  The CM number, the CA number, or the CPSU number is displayed.
  By clicking the CM number, the [Controller Module] screen is displayed. Refer to "10.1.5 Controller Module Detail" (page 652) for display items.
  By clicking the CA number, the [Channel Adapter] screen is displayed. Refer to "10.1.6 Channel Adapter Detail" (page 655) for display items.
  By clicking the CPSU number, the [Controller Enclosure Power Supply Unit] screen is displayed. Refer to "10.1.11 PSU/CPSU (CE) Detail" (page 664) for display items.
- Status
  The CM status, the CA status, or the CPSU status is displayed. Refer to "B.5 Component Status" (page 977) for details.

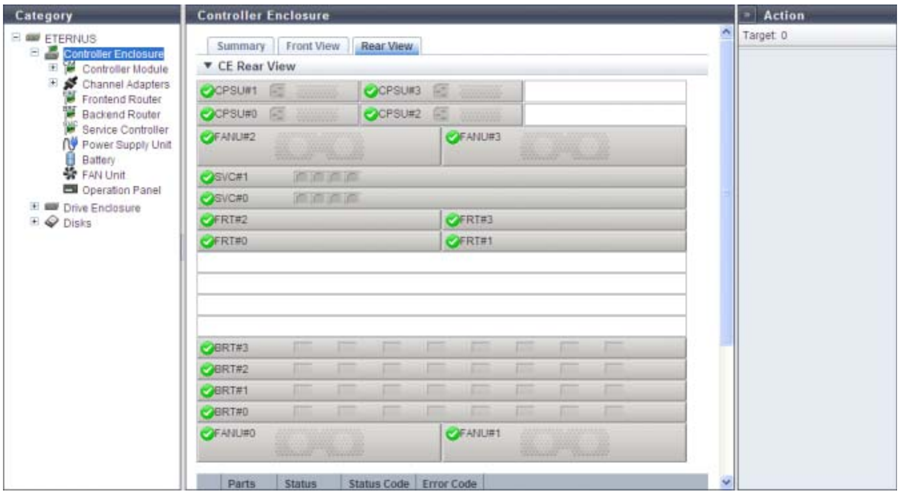
● For ETERNUS DX8100 S2



The following items are displayed in the Main area:

- Device image
  The rear view of the CE that is installed in the ETERNUS DX Disk storage system is displayed.
  The CM status, the CA status, the BUD status, and the CPSU status are displayed with icons.
  By clicking the CM number, the [Controller Module] screen is displayed. Refer to "10.1.5 Controller Module Detail" (page 652) for display items.
  By clicking the CA number, the [Channel Adapter] screen is displayed. Refer to "10.1.6 Channel Adapter Detail" (page 655) for display items.
  By clicking the BUD number, the [Boot and Utility Device] screen is displayed. Refer to "10.1.19 Boot and Utility Device Detail" (page 679) for details.
  By clicking the CPSU number, the [Controller Enclosure Power Supply Unit] screen is displayed. Refer to "10.1.11 PSU/CPSU (CE) Detail" (page 664) for display items.
- Parts
  The CM number, the CA number, the BUD number, or the CPSU number is displayed.
  By clicking the CM number, the [Controller Module] screen is displayed. Refer to "10.1.5 Controller Module Detail" (page 652) for display items.
  By clicking the CA number, the [Channel Adapter] screen is displayed. Refer to "10.1.6 Channel Adapter Detail" (page 655) for display items.
  By clicking the BUD number, the [Boot and Utility Device] screen is displayed. Refer to "10.1.19 Boot and Utility Device Detail" (page 679) for details.
  By clicking the CPSU number, the [Controller Enclosure Power Supply Unit] screen is displayed. Refer to "10.1.11 PSU/CPSU (CE) Detail" (page 664) for display items.
- Status
  The CM status, the CA status, the BUD status, or the CPSU status is displayed. Refer to "B.5 Component Status" (page 977) for details.

- For ETERNUS DX8700 S2

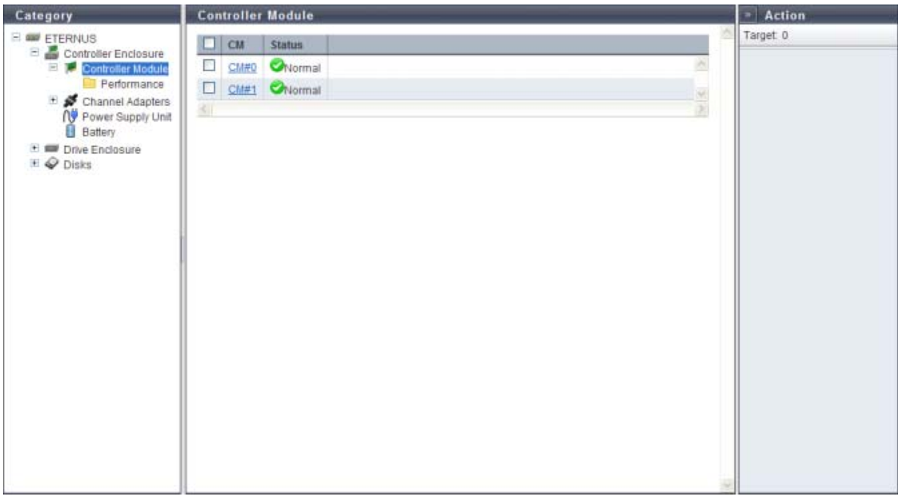


The following items are displayed in the Main area:

- Device image
  The rear view of the CE that is installed in the ETERNUS DX Disk storage system is displayed.
  The CPSU status, the FANU status, the SVC status, FRT status, and the BRT status are displayed with icons.
  By clicking the CPSU number, the [Controller Enclosure Power Supply Unit] screen is displayed. Refer to "10.1.11 PSU/CPSU (CE) Detail" (page 664) for display items.
  By clicking the FANU number, the [FAN Unit] screen is displayed. Refer to "10.1.13 FAN Unit Detail" (page 667) for display items.
  By clicking the SVC number, the [Service Controller] screen is displayed. Refer to "10.1.10 Service Controller Detail" (page 662) for display items.
  By clicking the FRT number, the [Frontend Router] screen is displayed. Refer to "10.1.7 Frontend Router Detail" (page 658) for display items.
  By clicking the BRT number, the [Backend Router] screen is displayed. Refer to "10.1.8 Backend Router Detail" (page 659) for display items.
- Parts
  The CPSU number, the FANU number, the SVC number, the FRT number, or the BRT number is displayed.
  By clicking the CPSU number, the [Controller Enclosure Power Supply Unit] screen is displayed. Refer to "10.1.11 PSU/CPSU (CE) Detail" (page 664) for display items.
  By clicking the FANU number, the [FAN Unit] screen is displayed. Refer to "10.1.13 FAN Unit Detail" (page 667) for display items.
  By clicking the SVC number, the [Service Controller] screen is displayed. Refer to "10.1.10 Service Controller Detail" (page 662) for display items.
  By clicking the FRT number, the [Frontend Router] screen is displayed. Refer to "10.1.7 Frontend Router Detail" (page 658) for display items.
  By clicking the BRT number, the [Backend Router] screen is displayed. Refer to "10.1.8 Backend Router Detail" (page 659) for display items.
- Status
  The CPSU status, the FANU status, the SVC status, FRT status, or the BRT status is displayed. Refer to "B.5 Component Status" (page 977) for details.
- Status Code
  The status code of CPSU, FANU, SVC, FRT, or BRT is displayed.
- Error Code
  The error code of CPSU, FANU, SVC, FRT, or BRT is displayed.

10.1.2.1 Controller Module

The CM information is displayed.



The following items are displayed in the Main area:

- CM
  The CM number is displayed. By clicking this item, the [Controller Module] screen is displayed. Refer to "10.1.5 Controller Module Detail" (page 652) for display items.
- Status
  The CM status is displayed. Refer to "B.5 Component Status" (page 977) for details.

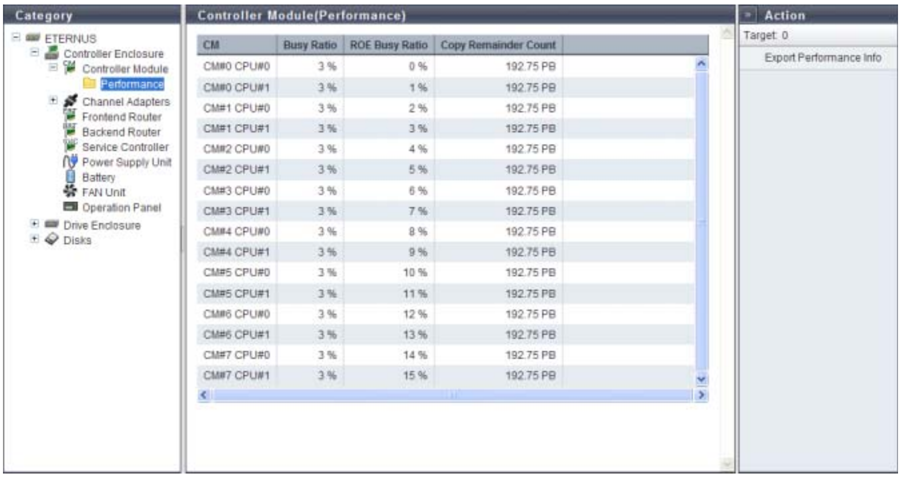
10.1.2.2 Controller Module (Performance)

The CM performance information is displayed.
If I/O offloading is enabled for the ETERNUS DX8700 S2, ROE#0 and ROE#1 are displayed for the ROE busy ratio.

Note

- Performance information is obtained when performance monitoring is operated from GUI, CLI, or any other monitoring software. Refer to "11.2.12.4 Start/Stop Performance Monitoring" (page 925) for details on how to start performance monitoring with GUI.
- The interval for acquiring performance information can be specified when starting the monitoring. When using GUI, the default interval is 30 seconds.
- The average performance values during the specified interval are displayed.

■ For ETERNUS DX8700 S2 when the I/O offloading is disabled, ETERNUS DX80 S2/DX90 S2, ETERNUS DX410 S2/DX440 S2, or ETERNUS DX8100 S2

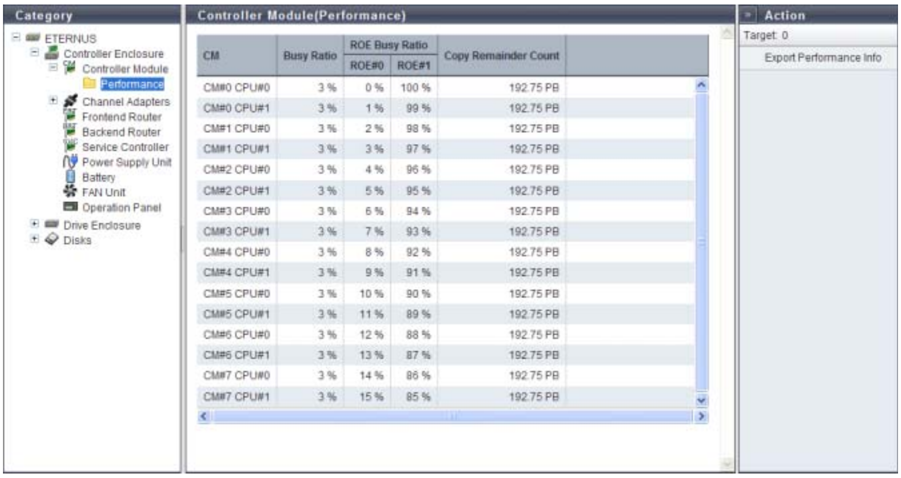


The following items are displayed in the Main area:

- CM
  The CM number and the CPU number are displayed.
- Busy Ratio
  The CPU utilization rate is displayed.
  For the ETERNUS DX80 S2/DX 90 S2, the ROE busy ratio is included in this value.
- ROE Busy Ratio
  The ROE utilization rate of the CPU (*1) is displayed.

  *1: RAID Offload Engine (ROE) performs encryption or parity creation processes with RAID5 and RAID6. The "ROE Busy Ratio" indicates the CPU utilization rate for ROE. For the ETERNUS DX80 S2/DX90 S2, "0%" is displayed. For the ETERNUS DX8700 S2, this item is displayed only when I/O offloading is disabled. To check the I/O offloading setting (enable or disable), refer to the [System Settings] screen. Refer to "11.1.12 System Settings" (page 731) for details.
- Copy Remainder Count
  The remaining capacity of the copy session is displayed.
  "Copy Remainder Count" is displayed for each controlling CM-CPU in the RAID group to which the copy source volume belongs.

For ETERNUS DX8700 S2 when the I/O offloading is enabled

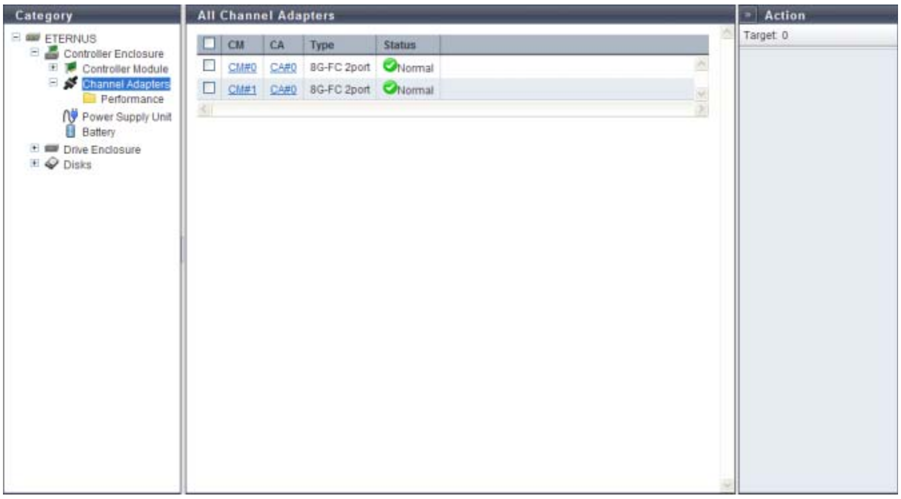


The following items are displayed in the Main area:

- CM
  The CM number and the CPU number are displayed.
- Busy Ratio
  The CPU utilization rate is displayed.
  For the ETERNUS DX80 S2/DX 90 S2, the ROE busy ratio is included in this value.
- ROE Busy Ratio
  The ROE utilization rate of the CPU (*1) is displayed.
  *1: RAID Offload Engine (ROE) performs encryption or parity creation processes with RAID5 and RAID6. The "ROE Busy Ratio" indicates the CPU utilization rate for ROE. For the ETERNUS DX8700 S2, "ROE#0" and "ROE#1" are displayed only when I/O offloading is enabled. To check the I/O offloading setting (enable or disable), refer to the [System Settings] screen. Refer to "11.1.12 System Settings" (page 731) for details.
  - ROE#0
    Busy Ratio of ROE#0 is displayed.
    REC#0 performs encryption processes, parity creation processes for RAID5 or RAID6, as well as some I/O processes.
    This item is displayed only for the ETERNUS DX8700 S2 when I/O offloading is enabled.
  - ROE#1
    Busy Ratio of ROE#1 is displayed.
    REC#1 performs encryption processes, parity creation processes for RAID5 or RAID6, as well as some I/O processes.
    This item is displayed only for the ETERNUS DX8700 S2 when I/O offloading is enabled.
- Copy Remainder Count
  The remaining capacity of the copy session is displayed.
  "Copy Remainder Count" is displayed for each controlling CM-CPU in the RAID group to which the copy source volume belongs.

10.1.2.3 All Channel Adapters

The information of all the CAs registered in the ETERNUS DX Disk storage system is displayed.



The following items are displayed in the Main area:

- CM
  The CM number is displayed. By clicking this item, the [Controller Module] screen is displayed. Refer to "10.1.5 Controller Module Detail" (page 652) for display items.
- CA
  The CA number is displayed. By clicking this item, the [Channel Adapter] screen is displayed. Refer to "10.1.6 Channel Adapter Detail" (page 655) for display items.
- Type
  The CA type is displayed.
  The display items in this filed vary depending on the storage system model.
  - For ETERNUS DX80 S2/DX90 S2
    - 8G-FC 2port
    - 16G-FC 2port
    - 10G-iSCSI 2port
    - 1G-iSCSI 2port
    - 6G-SAS 2port
    - 10G-FCoE 2port
  - For ETERNUS DX410 S2/DX440 S2
    - 8G-FC 2port
    - 8G-FC 4port
    - 16G-FC 2port
    - 16G-FC 4port
    - 10G-iSCSI 2port
    - 1G-iSCSI 2port
    - 10G-FCoE 2port
    - 1G-iSCSI-RA 2port

- For ETERNUS DX8100 S2/DX8700 S2
  - 8G-FC 2port
  - 8G-FC 4port
  - 16G-FC 2port
  - 16G-FC 4port
  - 10G-iSCSI 2port
  - 1G-iSCSI 2port
  - 10G-FCoE 2port
  - 1G-iSCSI-RA 2port

Note

The 1-port type CA provided by ETERNUS DX80 S2 is also displayed as a 2-port type. To determine whether the CA is 1-port type or 2-port-type, refer to the port number displayed in the [Internal Parts] tab in the "10.1.6 Channel Adapter Detail" (page 655). Note that 1-port type CAs are not available in some regions.

- Status
  The CA status is displayed. Refer to "B.5 Component Status" (page 977) for details.

10.1.2.4 Channel Adapter Ports (Performance)

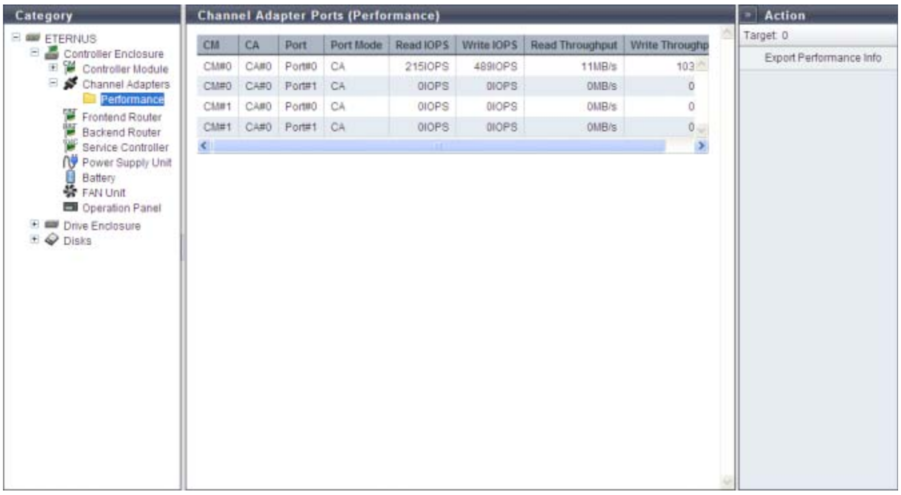
The CA port performance information is displayed.

Caution

When the port mode is "Initiator", the CA port performance is not displayed.

Note

- Performance information is obtained when performance monitoring is operated from GUI, CLI, or any other monitoring software. Refer to "11.2.12.4 Start/Stop Performance Monitoring" (page 925) for details on how to start performance monitoring with GUI.
- The interval for acquiring performance information can be specified when starting the monitoring. When using GUI, the default interval is 30 seconds.
- The average performance values during the specified interval are displayed.

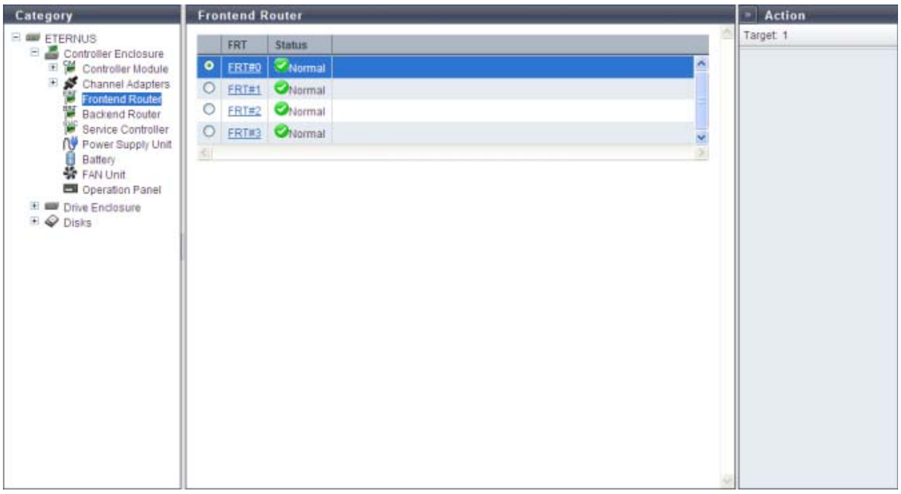


The following items are displayed in the Main area:

- CM
  The CM number is displayed.
- CA
  The CA number is displayed.
- Port
  The port number is displayed.
- Port Mode
  The port mode is displayed.
  - CA
  - RA
  - CA/RA
- Read IOPS
  The number of reads per second is displayed.
- Write IOPS
  The number of writes per second is displayed.
- Read Throughput
  The amount of data that is read per second is displayed.
- Write Throughput
  The amount of data that is written per second is displayed.

10.1.2.5 Frontend Router

The FRT information is displayed.
This item is displayed only when using the ETERNUS DX8700 S2.

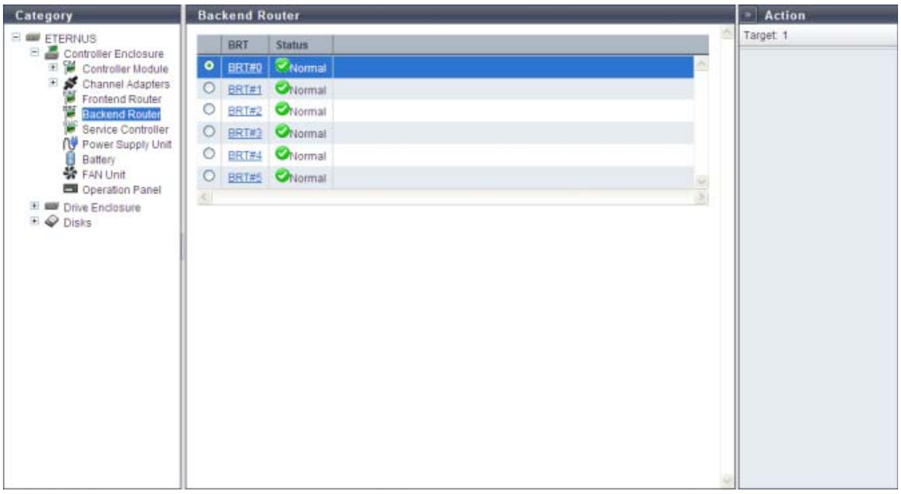


The following items are displayed in the Main area:

- FRT
  The FRT number is displayed. By clicking this item, the [Frontend Router] screen is displayed. Refer to "10.1.7 Frontend Router Detail" (page 658) for display items.
- Status
  The FRT status is displayed. Refer to "B.5 Component Status" (page 977) for details.

10.1.2.6 Backend Router

The Backend Router (BRT) information is displayed.
This item is displayed only when using the ETERNUS DX8700 S2.

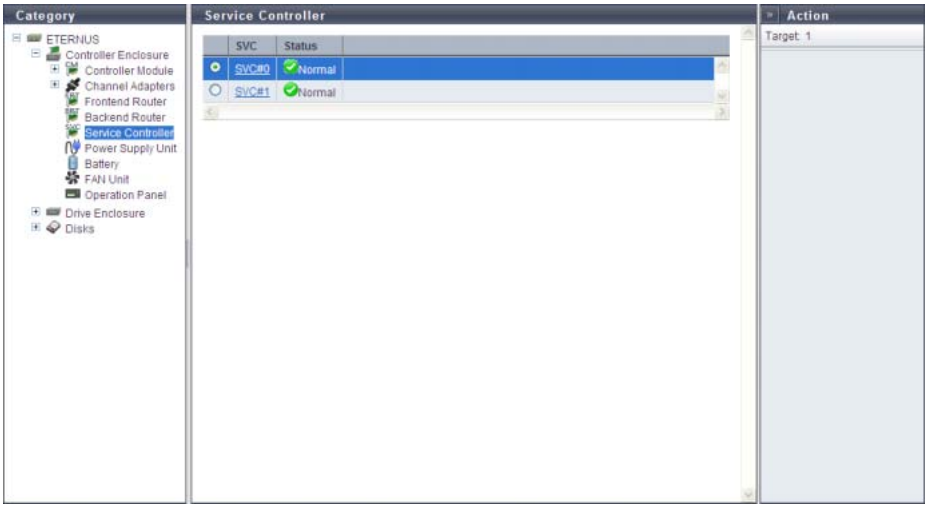


The following items are displayed in the Main area:

- BRT
  The BRT number is displayed. By clicking this item, the [Backend Router] screen is displayed. Refer to "10.1.8 Backend Router Detail" (page 659) for display items.
- Status
  The FRT status is displayed. Refer to "B.5 Component Status" (page 977) for details.

10.1.2.7 Service Controller

The Service Controller (SVC) information is displayed.
This item is displayed only when using the ETERNUS DX8700 S2.

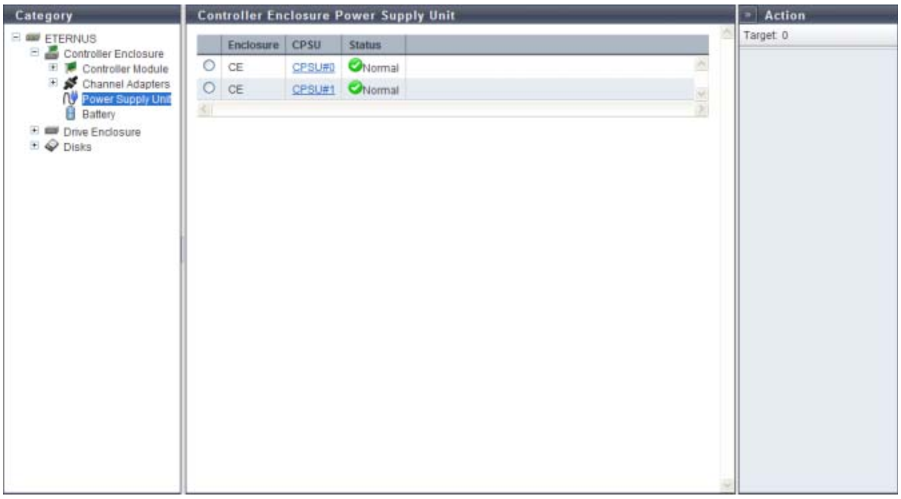


The following items are displayed in the Main area:

- SVC
  The SVC number is displayed. By clicking this item, the [Service Controller] screen is displayed. Refer to "10.1.10 Service Controller Detail" (page 662) for display items.
- Status
  The SVC status is displayed. Refer to "B.5 Component Status" (page 977) for details.

10.1.2.8 Power Supply Unit (CE)

The PSU information for a CE is displayed.



The following items are displayed in the Main area:

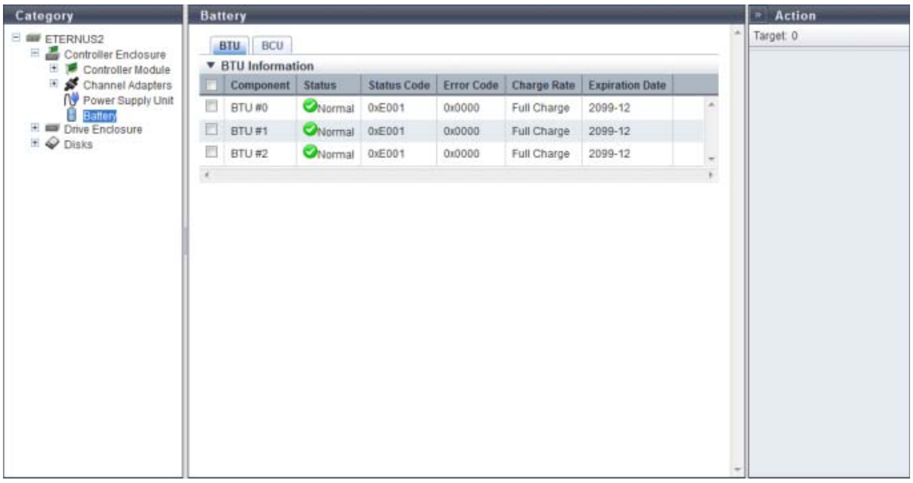
- Enclosure
  The enclosure where the PSU or the CPUS is installed is displayed.
- PSU
  The PSU number is displayed. By clicking this item, the [Controller Enclosure Power Supply Unit] screen is displayed. Refer to "10.1.11 PSU/CPSU (CE) Detail" (page 664) for display items.
  This item is displayed only when using the ETERNUS DX80 S2/DX90 S2.
- CPSU
  The CPSU number is displayed. By clicking this item, the [Controller Enclosure Power Supply Unit] screen is displayed. Refer to "10.1.11 PSU/CPSU (CE) Detail" (page 664) for display items.
  This item is displayed only when using the ETERNUS DX410 S2/DX440 S2 or the ETERNUS DX8100 S2/DX8700 S2.
- Status
  The PSU status or the CPSU status is displayed. Refer to "B.5 Component Status" (page 977) for details.

10.1.2.9 Battery

The information of the BTU and the BCU is displayed when the ETERNUS DX410 S2/DX440 S2 or the ETERNUS DX8100 S2 is used.
The information of the BBU is displayed when the ETERNUS DX8700 S2 is used.

■ For the ETERNUS DX410 S2/DX440 S2 or the ETERNUS DX8100 S2

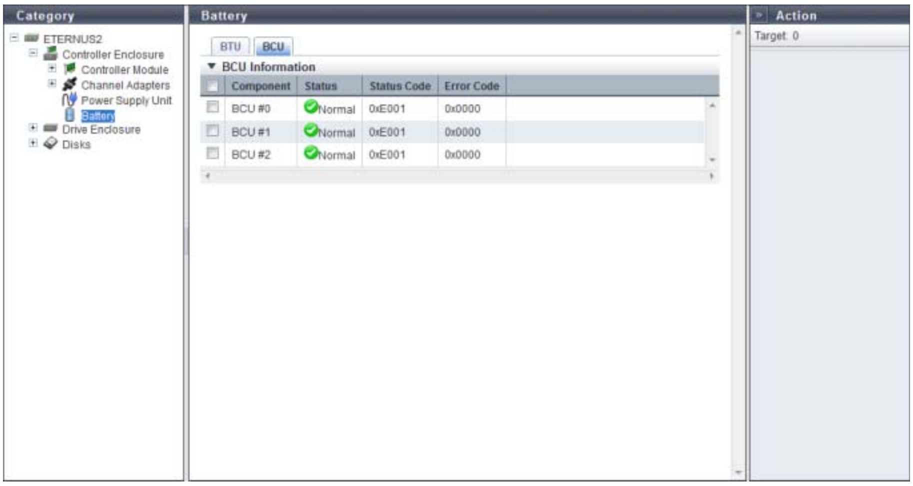
● BTU



The following items are displayed in the Main area:

- Component
  The BTU number is displayed.
- Status
  The BTU status is displayed. Refer to "B.5 Component Status" (page 977) for details.
- Status Code
  The BTU status code is displayed.
- Error Code
  The BTU error code is displayed.
- Charge Rate
  The BTU charge rate is displayed.
  When the battery charge level is 90% or more, "Full Charge" is displayed. When the battery charge level is less than 90%, "xx%" is displayed.
- Expiration Date
  The expiration date for the BTU is displayed.

● BCU

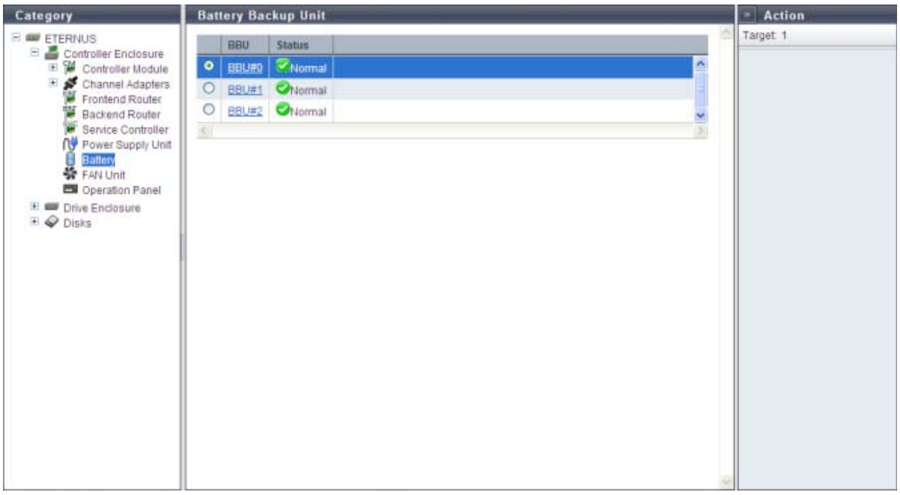


The following items are displayed in the Main area:

- Component
  The BCU number is displayed.
- Status
  The BCU status is displayed. Refer to "B.5 Component Status" (page 977) for details.
- Status Code
  The BCU status code is displayed.
- Error Code
  The BCU error code is displayed.

For the ETERNUS DX8700 S2

● BBU

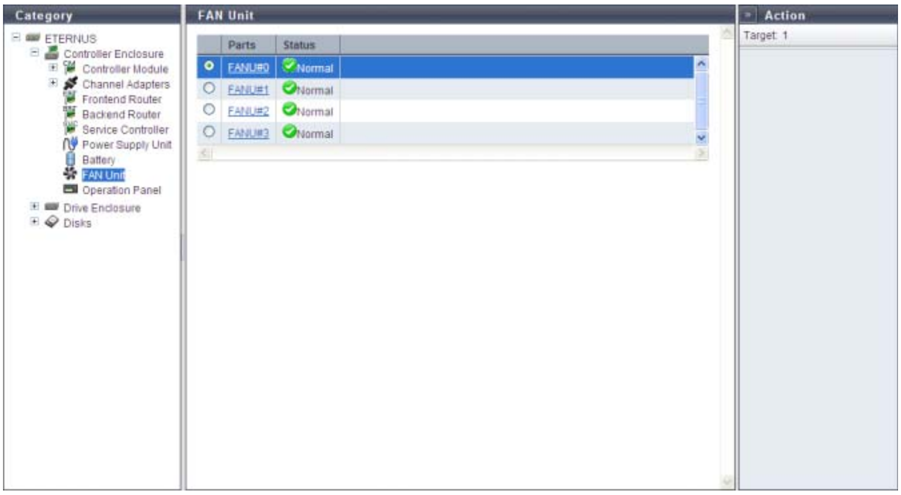


The following items are displayed in the Main area:

- BBU
  The BBU number is displayed. By clicking this item, the [Battery Backup Unit] screen is displayed. Refer to "10.1.12 Battery Backup Unit Detail" (page 666) for display items.
- Status
  The BBU status is displayed. Refer to "B.5 Component Status" (page 977) for details.

10.1.2.10 FAN Unit

The FAN Unit information is displayed.
This item is displayed only when using the ETERNUS DX8700 S2.



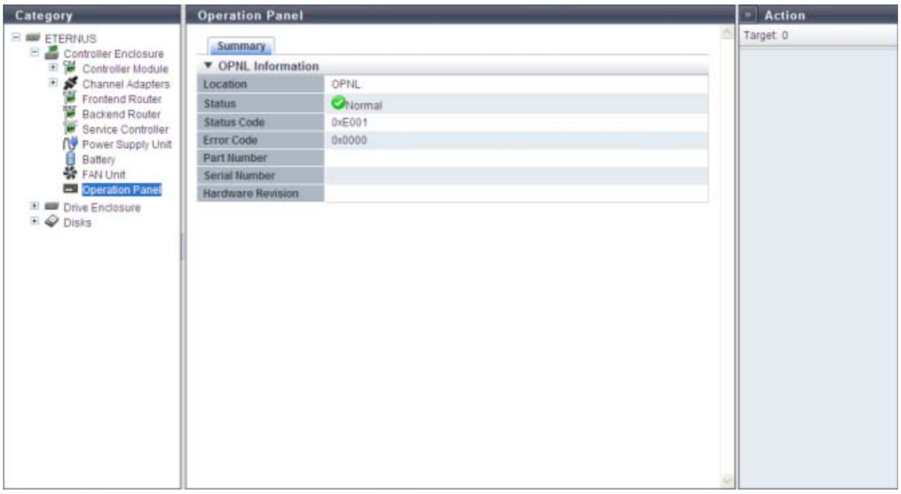
The following items are displayed in the Main area:

- Parts
  The FAN Unit number is displayed. By clicking this item, the [FAN Unit] screen is displayed. Refer to "10.1.13 FAN Unit Detail" (page 667) for display items.
- Status
  The FAN Unit status is displayed. Refer to "B.5 Component Status" (page 977) for details.

10.1.2.11 Operation Panel

The Operation Panel (OPNL) information is displayed.
This item is displayed only when using the ETERNUS DX8700 S2.

Summary

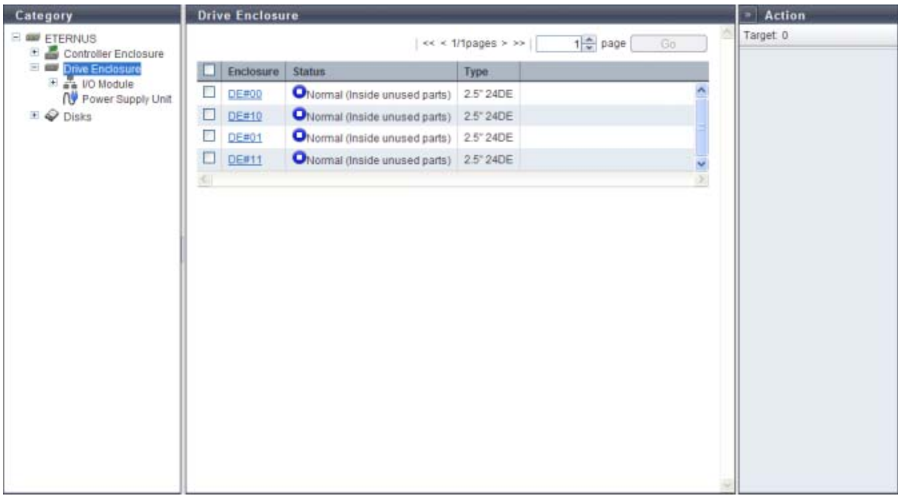


The following items are displayed in the Main area:

- Location
  The OPNL is displayed.
- Status
  The OPNL status is displayed. Refer to "B.5 Component Status" (page 977) for details.
- Status Code
  The OPNL status code is displayed.
- Error Code
  The OPNL error code is displayed.

10.1.3 Drive Enclosure

The DE information is displayed.

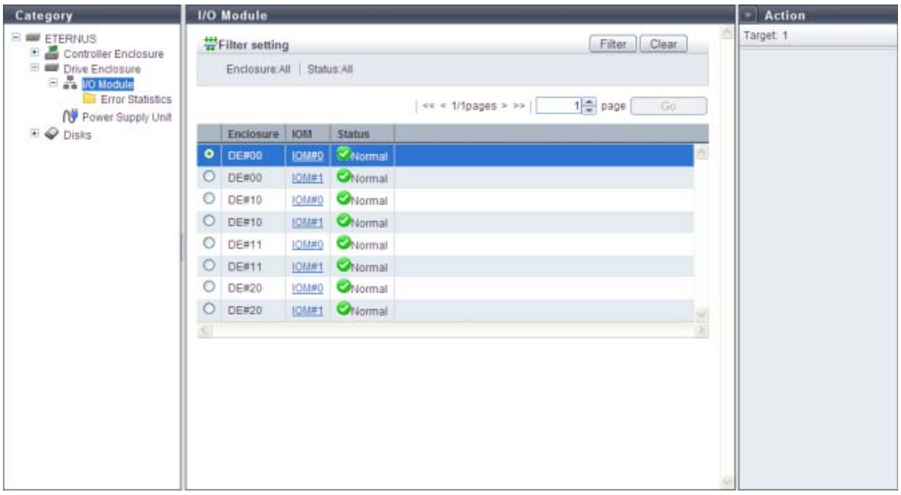


The following items are displayed in the Main area:

- Enclosure
  The DE number is displayed. By clicking this item, the [Drive Enclosure] screen is displayed. Refer to "10.1.14 Drive Enclosure Detail" (page 669) for display items.
- Status
  The DE status is displayed. Refer to "B.5 Component Status" (page 977) for details.
- Type
  The drive size and the maximum number of drives that can be installed in the drive enclosure are displayed.

10.1.3.1 I/O Module

The I/O Module (IOM) information is displayed.



The following items are displayed in the Main area:

- Enclosure
  The enclosure where the IOM is installed is displayed.
- IOM
  The IOM number is displayed. By clicking this item, the [I/O Module] screen is displayed. Refer to "10.1.15 I/O Module Detail" (page 672) for display items.
- Status
  The IOM status is displayed. Refer to "B.5 Component Status" (page 977) for details.

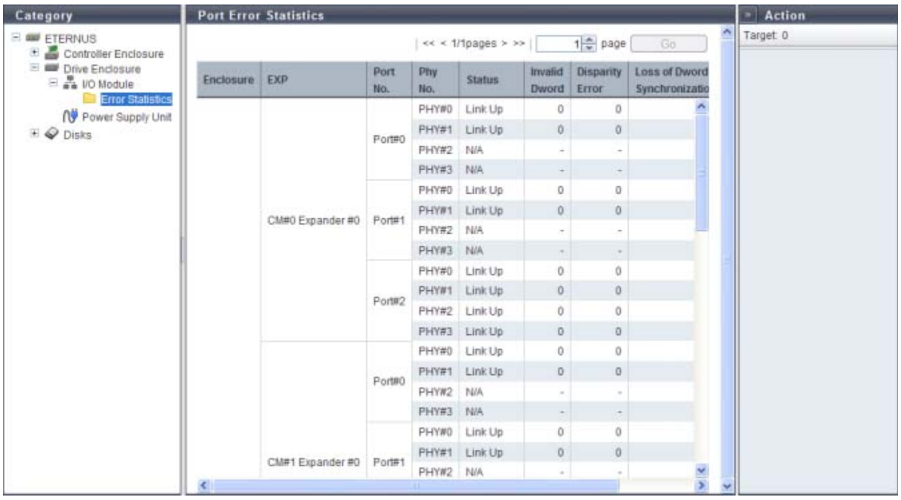
Filter Setting

Filter Setting field is displayed only when using the ETERNUS DX8700 S2.

Filter	Description
Enclosure	Select the enclosure that is to be displayed.
Status	Select the IOM status that is to be displayed.

10.1.3.2 Port Error Statistics

The total number of errors for CM expander and DE IOM ports is displayed.
An increasing number of errors in the information is used to notify early replacement for warning status components. This can also be used as analysis information when performance is reduced.



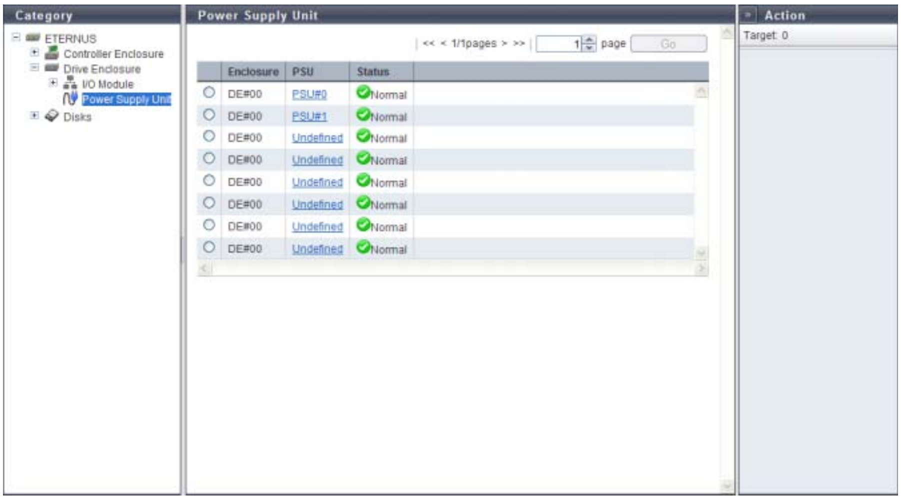
The following items are displayed in the Main area:

- Enclosure
  The enclosure where the CM expander and DE IOM are installed is displayed.
- EXP
  The installation location of the expander is displayed.
- Port No.
  The port number is displayed.
- Phy No.
  The Phy number of the port is displayed.

- Status
  The Phy status is displayed.
  - Link Up
  - Link Down
  - N/A
- Invalid Dword
  The number of Invalid Dword occurrences is displayed.
- Disparity Error
  The number of Disparity Error occurrences is displayed.
- Loss of Dword Synchronization
  The number of Loss of Dword Synchronization occurrences is displayed.
- Phy Reset Problem
  The number of Phy Reset Problem occurrences is displayed.

10.1.3.3 Power Supply Unit (DE)

The PSU information for a DE is displayed.

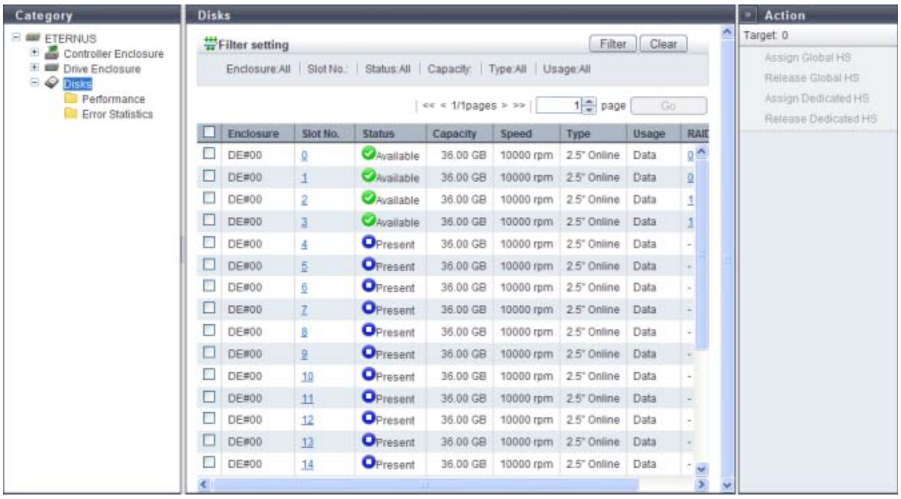


The following items are displayed in the Main area:

- Enclosure
  The enclosure where the PSU is installed is displayed.
- PSU
  The PSU number is displayed.
  By clicking this item, the [Power Supply Unit (DE)] screen is displayed. Refer to "10.1.16 Power Supply Unit (DE) Detail" (page 674) for display items.
- Status
  The PSU status is displayed. Refer to "B.5 Component Status" (page 977) for details.

10.1.4 Disks

The drive information is displayed.



The following items are displayed in the Main area:

- Enclosure
  The enclosure where the drive is installed is displayed.
- Slot No.
  The slot number of the enclosure where the drive is installed is displayed. By clicking the drive image, the [Disks] screen is displayed. Refer to "10.1.17 Disks Detail" (page 675) for display items.
- Status
  The drive status is displayed. Refer to "B.5.1 Drive Status" (page 978) for details.
- Capacity
  The capacity of the drive is displayed.
- Speed
  The drive speed is displayed. For SSDs, a "-" (hyphen) is displayed.
  - 15000 rpm
  - 10000 rpm
  - 7200 rpm
- Type
  The drive type is displayed.
  - For 2.5-inch SAS disks: 2.5" Online
  - For 3.5-inch SAS disks: 3.5" Online
  - For 2.5-inch Nearline SAS disks: 2.5" Nearline
  - For 3.5-inch Nearline SAS disks: 3.5" Nearline
  - For 2.5-inch SSD: 2.5" SSD
  - For 3.5-inch SSD: 3.5" SSD
  - For 2.5-inch SED: 2.5" SED

- Usage
  The usage of the drive is displayed.
  - For a drive that is used for user data or an unused drive: Data
  - For a drive that is registered as a Global Hot Spare: Global Hot Spare
  - For a drive that is registered as a Dedicated Hot Spare: Dedicated Hot Spare
- RAID Group
  If the drive is registered in a RAID group, the RAID group name to which the drive belongs is displayed.
  By clicking this item, the [RAID Group Detail] screen is displayed.

Filter Setting

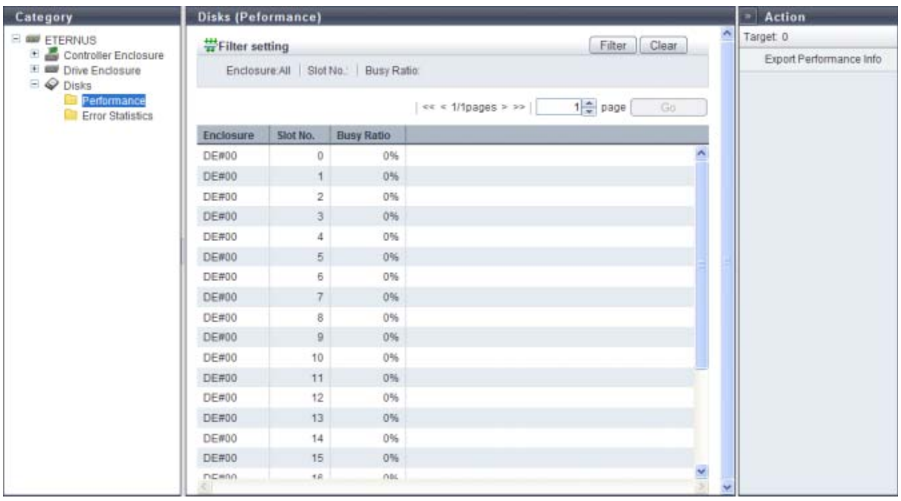
Filter	Description
Enclosure	Select the enclosure in which the target drive is installed.
Slot No.	Specify the slot number of the drive that is to be displayed. When not using the slot number for filtering, leave this item blank.
Status	Select the drive status that is to be displayed.
Capacity	Specify the capacity of the drive that is to be displayed. When not using the drive capacity for filtering, specify "0".
Type	Select the drive type that is to be displayed.
Usage	Select the usage of the drive that is to be displayed.

10.1.4.1 Disks (Performance)

The drive performance information is displayed.

Note

- Performance information is obtained when performance monitoring is operated from GUI, CLI, or any other monitoring software. Refer to "11.2.12.4 Start/Stop Performance Monitoring" (page 925) for details on how to start performance monitoring with GUI.
- The interval for acquiring performance information can be specified when starting the monitoring. When using GUI, the default interval is 30 seconds.
- The average performance values during the specified interval are displayed.



The following items are displayed in the Main area:

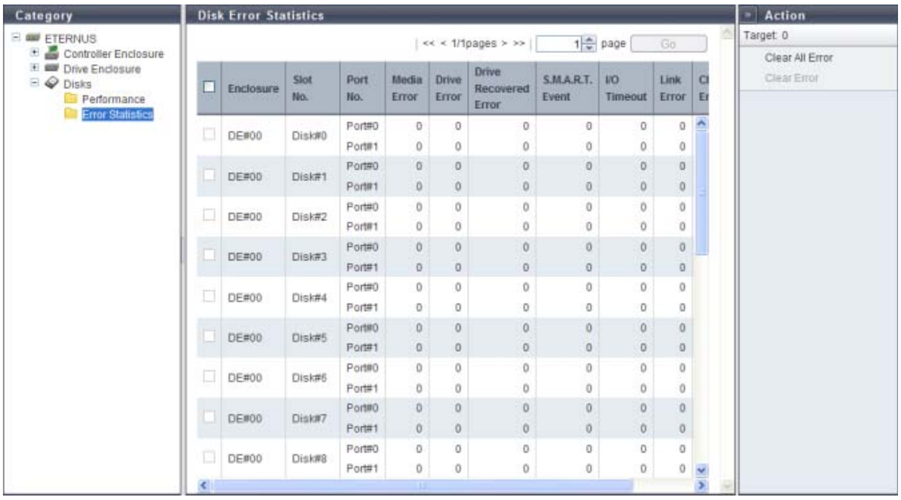
- Enclosure
  The enclosure where the drive is installed is displayed.
- Slot No.
  The slot number of the enclosure where the drive is installed is displayed.
- Busy Ratio
  The busy ratio of the drive is displayed. A "-" (hyphen) is displayed when the status is "Broken" or "Not Supported".

Filter Setting

Filter	Description
Enclosure	Select the enclosure in which the target drive is installed.
Slot No.	Specify the slot number of the drive that is to be displayed. When not using the slot number for filtering, leave this item blank.
Busy Ratio	Specify the busy ratio of the drive that is to be displayed. When not using the busy ratio for filtering, leave this item blank.

10.1.4.2 Disk Error Statistics

The total number of drive errors is displayed.
An increasing number of disk errors can be used as a sign for the early replacement of warning components or as information to analyze performance when performance is reduced.
Any unnecessary disk error information can be deleted.



The following items are displayed in the Main area:

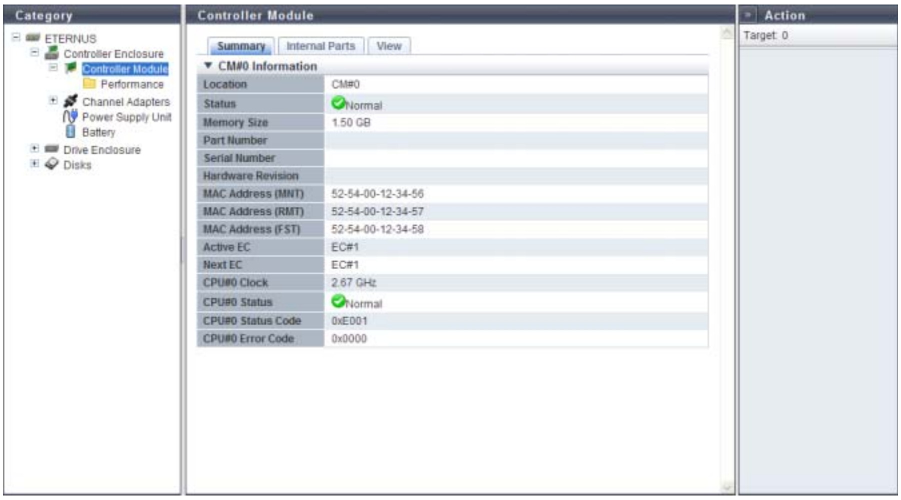
- Enclosure
  The enclosure where the drive is installed is displayed.
- Slot No.
  The slot number of the enclosure where the drive is installed is displayed.
- Port No.
  The drive port number is displayed.

- Media Error
  The number of Media Error occurrences is displayed.
- Drive Error
  The number of Drive Error occurrences is displayed.
- Drive Recovered Error
  The number of Drive Recovered Error occurrences is displayed.
- S.M.A.R.T. Event
  The number of S.M.A.R.T. Event occurrences is displayed.
- I/O Timeout
  The number of I/O Timeout occurrences is displayed.
- Link Error
  The number of Link Error occurrences is displayed.
- Check Code Error
  The number of Check Code Error occurrences is displayed.

10.1.5 Controller Module Detail

The detailed CM information is displayed.

Summary

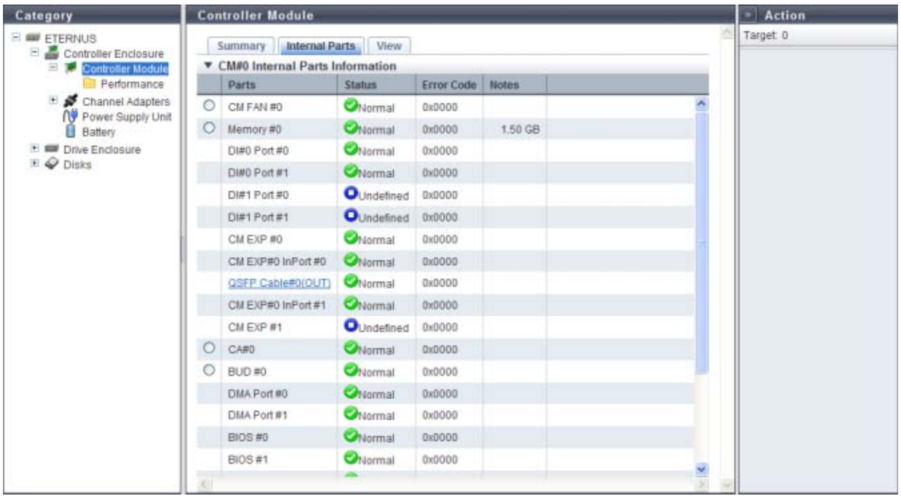


The following items are displayed in the Main area:

- Location
  The CM number is displayed.
- Status
  The CM status is displayed. Refer to "B.5 Component Status" (page 977) for details.
- Memory Size
  The cache memory capacity of the CM is displayed.
- Part Number
  The CM port number is displayed.

- Serial Number
  The serial number of the CM is displayed.
- Hardware Revision
  The hardware version of the CM is displayed.
- MAC Address (MNT)
  The MAC address of the MNT Port is displayed.
  This item is displayed only when using the ETERNUS DX80 S2/DX90 S2, the ETERNUS DX410 S2/DX440 S2, or the ETERNUS DX8100 S2.
- MAC Address (RMT)
  The MAC address of the RMT Port is displayed.
  This item is displayed only when using the ETERNUS DX80 S2/DX90 S2, the ETERNUS DX410 S2/DX440 S2, or the ETERNUS DX8100 S2.
- MAC Address (FST)
  The MAC address of the FST Port is displayed.
  This item is displayed only when using the ETERNUS DX410 S2/DX440 S2 or the ETERNUS DX8100 S2.
- Active EC
  The Edition Control (EC) number of the currently running firmware is displayed.
- Next EC
  The EC number of the firmware that is to be run at the next power-on is displayed.
- CPU#n Clock
  The clock frequency of CPU#0 or CPU#1 is displayed.
- CPU#n Status
  The status of CPU#0 or CPU#1 is displayed. Refer to "B.5 Component Status" (page 977) for details.
- CPU#n Status Code
  The status code of CPU#0 or CPU#1 is displayed.
- CPU#n Error Code
  The error code of CPU#0 or CPU#1 is displayed.

Internal Parts



The following items are displayed in the Main area:

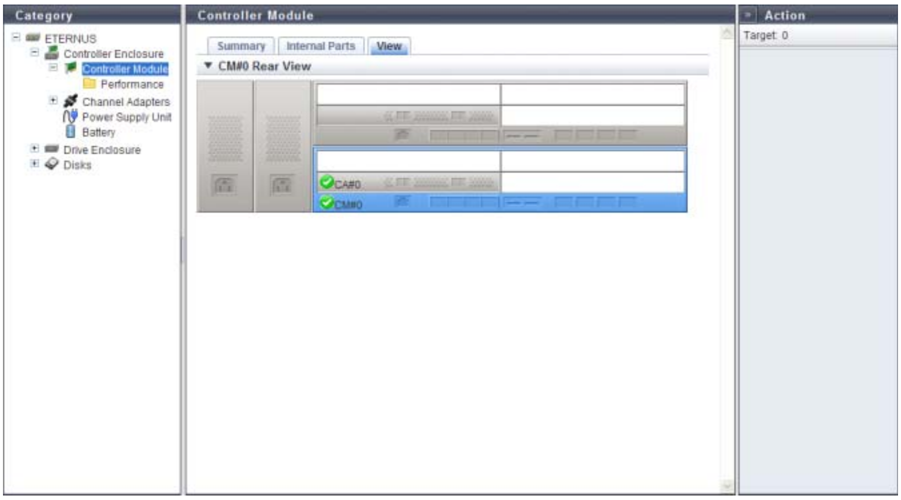
- Parts
  The component name and the component number are displayed.
  A link is displayed for the ETERNUS DX80 S2/DX90 S2, the ETERNUS DX410 S2/DX440 S2, or the ETERNUS DX8100 S2 when the "Parts" is "QSFP Cable". Click this link to display the [QSFP Cable] screen. Refer to "10.1.18 QSFP Cable Detail" (page 678) for display items.
  A link is displayed for the ETERNUS DX8100 S2/DX8700 S2 when the "Parts" is "BUD". Click this link to display the [Boot and Utility Device] screen. Refer to "10.1.19 Boot and Utility Device Detail" (page 679) for display items.
  A link is displayed for the ETERNUS DX8700 S2 when the "Parts" is "CA". Click this link to display the [Channel Adapter] screen. Refer to "10.1.6 Channel Adapter Detail" (page 655) for display items.
  A link is displayed for the ETERNUS DX8700 S2 when the "Parts" is "CM MMC". Click this link to display the [CM Module Management Controller] screen. Refer to "10.1.20 CM Module Management Controller Detail" (page 680) for display items.

- Status
  The component status is displayed. Refer to "B.5 Component Status" (page 977) for details.

- Error Code
  The component error code is displayed.

- Notes
  Remarks are displayed.
  - When "Parts" is "Memory", the memory capacity is displayed.
  - When "Parts" is "SCU", the voltage information is displayed (for the ETERNUS DX80 S2/DX90 S2).

View



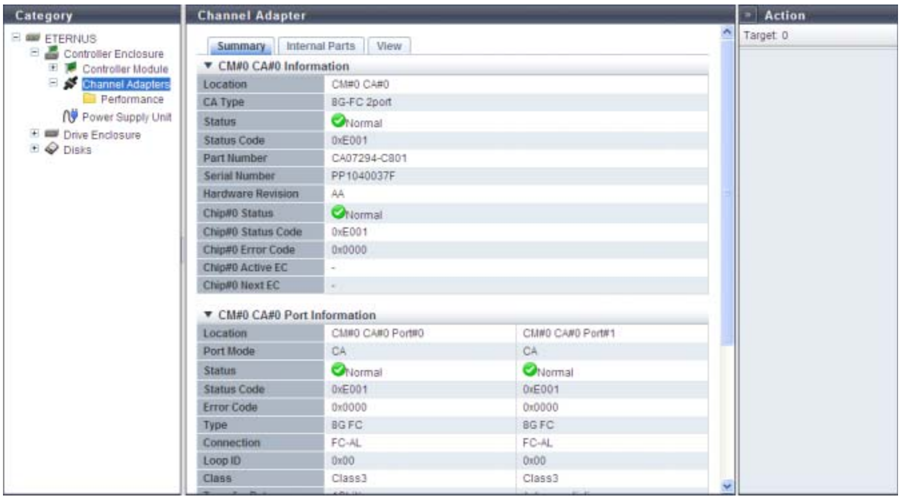
The following items are displayed in the Main area:

- Device image
  The rear view or front view of the CE that is installed in the ETERNUS DX Disk storage system is displayed.
  For the ETERNUS DX80 S2/DX90 S2, the ETERNUS DX410 S2/DX440 S2, or the ETERNUS DX8100 S2, the rear view is displayed.
  For the ETERNUS DX8700 S2, the front view is displayed.
  Components that are not CMs are grayed out.
  The CM status is displayed with an icon. Refer to "B.5 Component Status" (page 977) for display items.
  When using the ETERNUS DX8100 S2/DX8700 S2, clicking the BUD number displays the [Boot and Utility Device] screen. Refer to "10.1.19 Boot and Utility Device Detail" (page 679) for display items.
  When using the ETERNUS DX8700 S2, clicking the CA number displays the [Channel Adapter] screen. Refer to "10.1.6 Channel Adapter Detail" (page 655) for display items.

10.1.6 Channel Adapter Detail

The detailed information for the Channel Adapter is displayed.

Summary



The following items are displayed in the Main area:

- Location
  The CA installation location is displayed.
- CA Type
  The CA type is displayed.
  The display items in this field vary depending on the storage system model.
  - For ETERNUS DX80 S2/DX90 S2
    - 8G-FC 2port
    - 16G-FC 2port
    - 10G-iSCSI 2port
    - 1G-iSCSI 2port
    - 6G-SAS 2port
    - 10G-FCoE 2port

- For ETERNUS DX410 S2/DX440 S2
    - 8G-FC 2port
    - 8G-FC 4port
    - 16G-FC 2port
    - 16G-FC 4port
    - 10G-iSCSI 2port
    - 1G-iSCSI 2port
    - 10G-FCoE 2port
    - 1G-iSCSI-RA 2port
- For ETERNUS DX8100 S2/DX8700 S2
    - 8G-FC 2port
    - 8G-FC 4port
    - 16G-FC 2port
    - 16G-FC 4port
    - 10G-iSCSI 2port
    - 1G-iSCSI 2port
    - 10G-FCoE 2port
    - 1G-iSCSI-RA 2port

Note

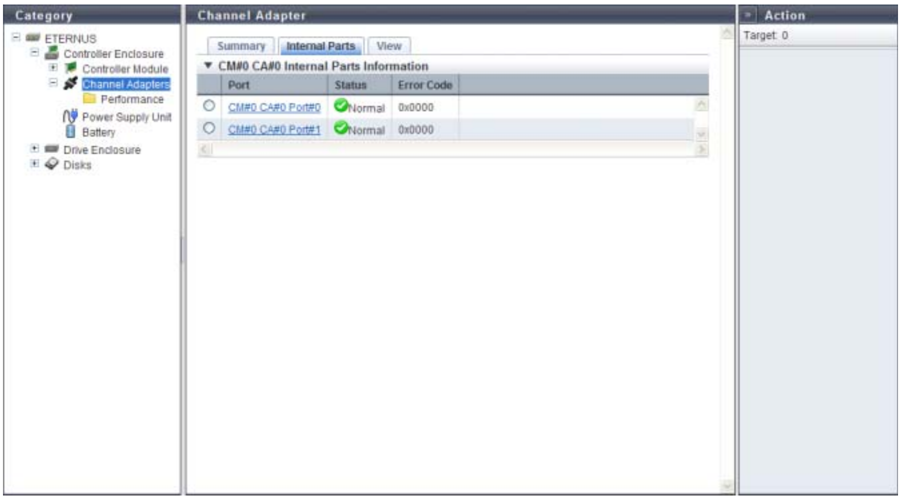
The 1-port type CA provided by ETERNUS DX80 S2 is also displayed as a 2-port type. To determine whether the CA is 1-port type or 2-port-type, refer to the port number displayed in the [Internal Parts] tab. Note that 1-port type CAs are not available in some regions.

- Status
  The CA status is displayed. Refer to "B.5 Component Status" (page 977) for details.
- Status Code
  The CA status code is displayed.
- Part Number
  The CA part number is displayed.
- Serial Number
  The serial number of the CA is displayed.
- Hardware Revision
  The hardware version of the CA is displayed.
- Chip#n Status
  The status of Chip#0 or Chip#1 is displayed. Refer to "B.5 Component Status" (page 977) for details.
- Chip#n Status Code
  The status code of Chip#0 or Chip#1 is displayed.
- Chip#n Error Code
  The error code of Chip#0 or Chip#1 is displayed.
- Chip#n Active EC
  The Edition Control (EC) number of the currently running Chip#0 or Chip#1 is displayed.
- Chip#n Next EC
  The EC number of the Chip#0 or the Chip#1 that is to be run at the next power-on is displayed.

- CM#x CA#y Port Information

  The detailed information of all the ports is displayed. Refer to "FC port" (page 681), "iSCSI port" (page 687), "SAS port" (page 690), or "FCoE port" (page 691) for display contents.

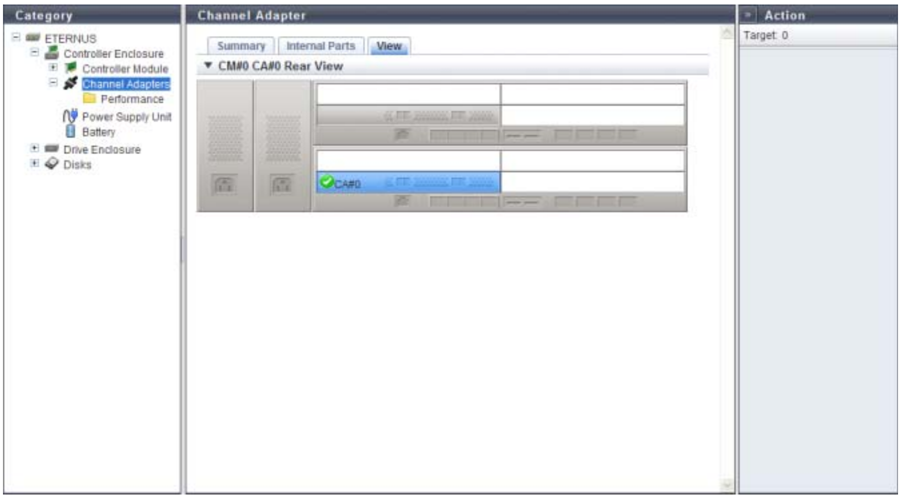
Internal Parts



The following items are displayed in the Main area:

- Port
  The CA port number is displayed. By clicking this item, the [Port] screen is displayed. Refer to "10.1.21 Port Detail" (page 681) for display items.
- Status
  The CA port status is displayed. Refer to "B.5 Component Status" (page 977) for details.
- Error Code
  The CA port error code is displayed.

View



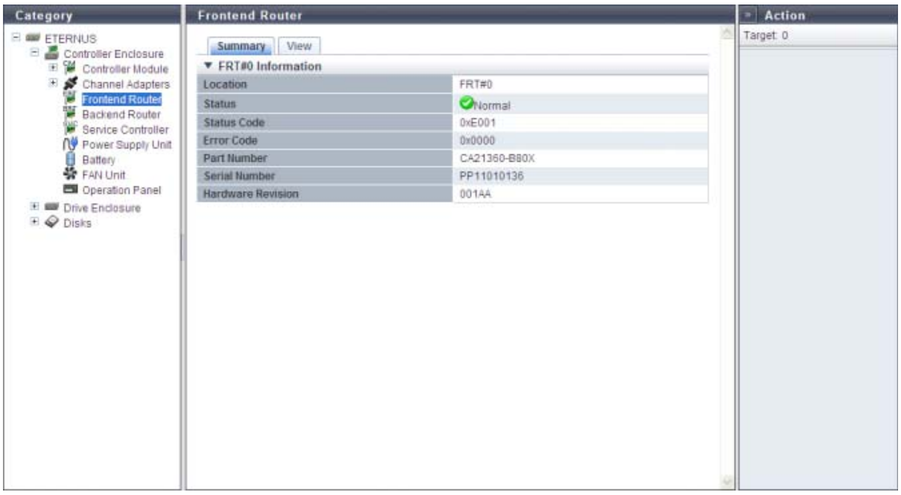
The following items are displayed in the Main area:

- Device image
  The rear view or front view of the CE that is installed in the ETERNUS DX Disk storage system is displayed.
  For the ETERNUS DX80 S2/DX90 S2, the ETERNUS DX410 S2/DX440 S2, or the ETERNUS DX8100 S2, the rear view is displayed.
  For the ETERNUS DX8700 S2, the front view is displayed.
  Components that are not CAs are grayed out.
  The CA status is displayed with an icon. Refer to "B.5 Component Status" (page 977) for details.

10.1.7 Frontend Router Detail

The detailed information for the FRT is displayed.

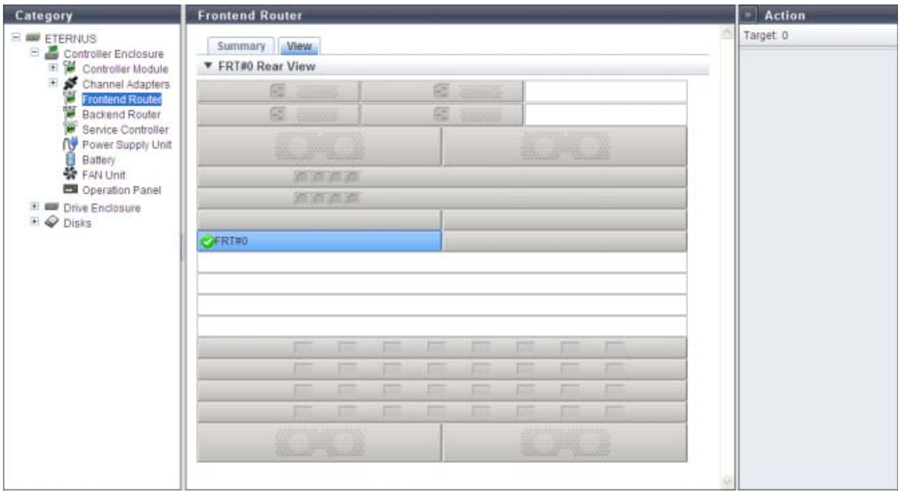
Summary



The following items are displayed in the Main area:

- Location
  The FRT number is displayed.
- Status
  The FRT status is displayed. Refer to "B.5 Component Status" (page 977) for details.
- Status Code
  The FRT status code is displayed.
- Error Code
  The FRT error code is displayed.
- Part Number
  The part number of the FRT is displayed.
- Serial Number
  The serial number of the FRT is displayed.
- Hardware Revision
  The hardware version of the FRT is displayed.

View



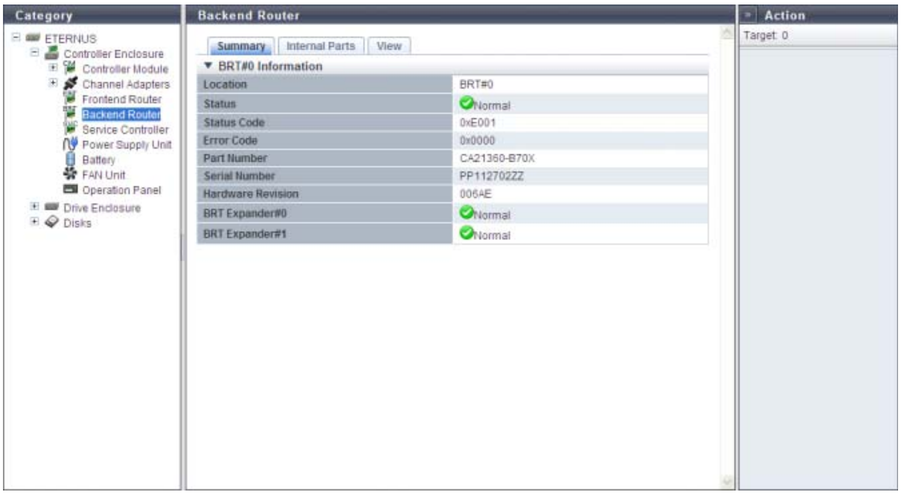
The following items are displayed in the Main area:

- Device image
  The rear view of the CE that is installed in the ETERNUS DX Disk storage system is displayed.
  Components that are not the target FRT is grayed out.
  The FRT status is displayed with an icon. Refer to "B.5 Component Status" (page 977) for details.

10.1.8 Backend Router Detail

The detailed information for the BRT is displayed.

Summary



The following items are displayed in the Main area:

- Location
  The BRT number is displayed.

- Status
  The BRT status is displayed. Refer to "B.5 Component Status" (page 977) for details.

- Status Code
  The BRT status code is displayed.

- Error Code
  The BRT error code is displayed.

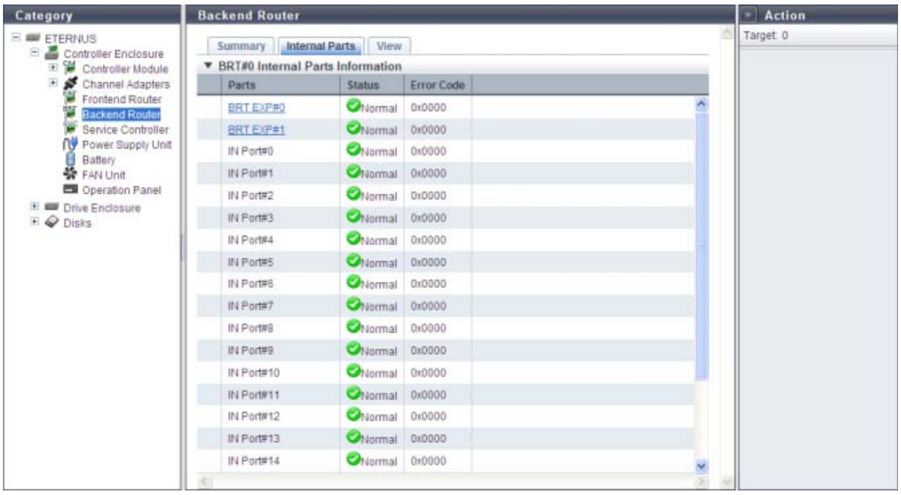
- Part Number
  The part number of the BRT is displayed.

- Serial Number
  The serial number of the BRT is displayed.

- Hardware Revision
  The hardware version of the BRT is displayed.

- BRT Expander#n
  The status of BRT Expander#0 or BRT Expander#1 is displayed. Refer to "B.5 Component Status" (page 977) for details.

Internal Parts



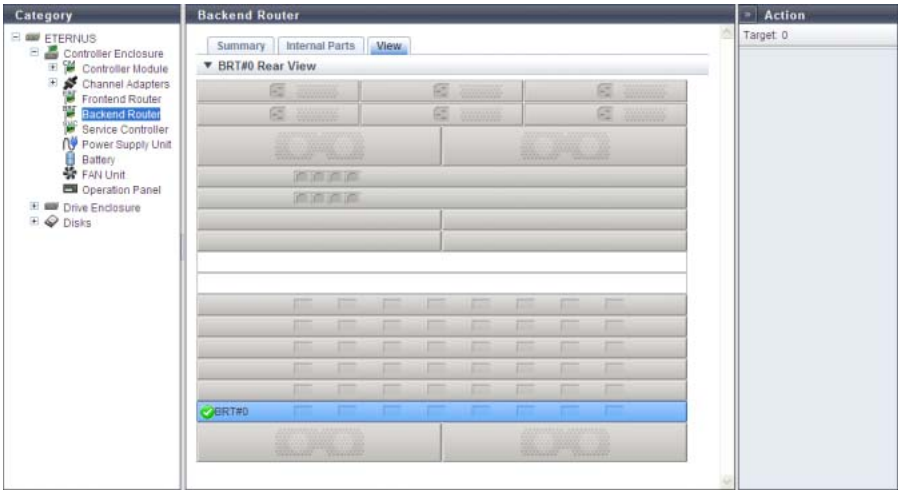
The following items are displayed in the Main area:

- Parts
  The component name and the component number are displayed.
  Links are displayed for [BRT EXP] and [QSFP Cable]. By clicking either of them, the [BRT Expander] screen or the [QSFP Cable] screen is displayed. Refer to "10.1.9 BRT Expander Detail" (page 661) or "10.1.18 QSFP Cable Detail" (page 678) for display items.

- Status
  The part status is displayed. Refer to "B.5 Component Status" (page 977) for details.

- Error Code
  The part error code is displayed.

View



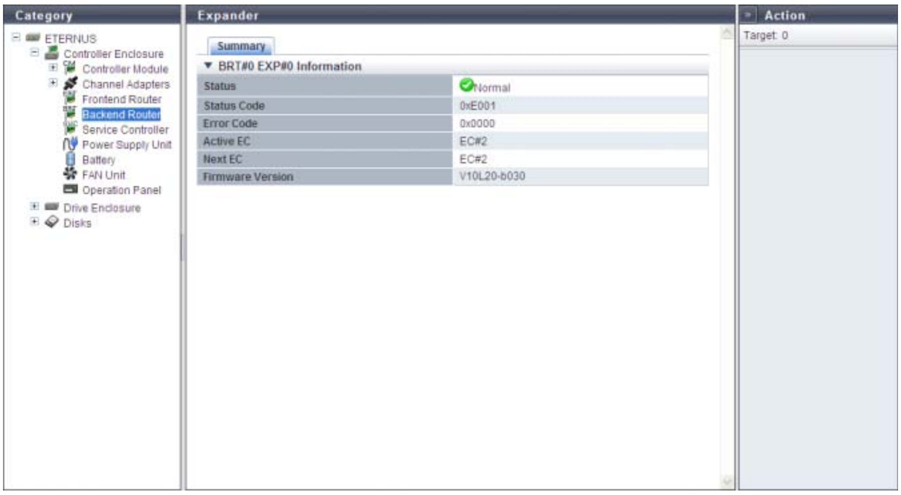
The following items are displayed in the Main area:

- Device image
  The rear view of the CE that is installed in the ETERNUS DX Disk storage system is displayed.
  Components that are not the target BRT are grayed out.
  The BRT status is displayed with an icon. Refer to "B.5 Component Status" (page 977) for details.

10.1.9 BRT Expander Detail

The detailed information of the BRT Expander is displayed.

Summary



The following items are displayed in the Main area:

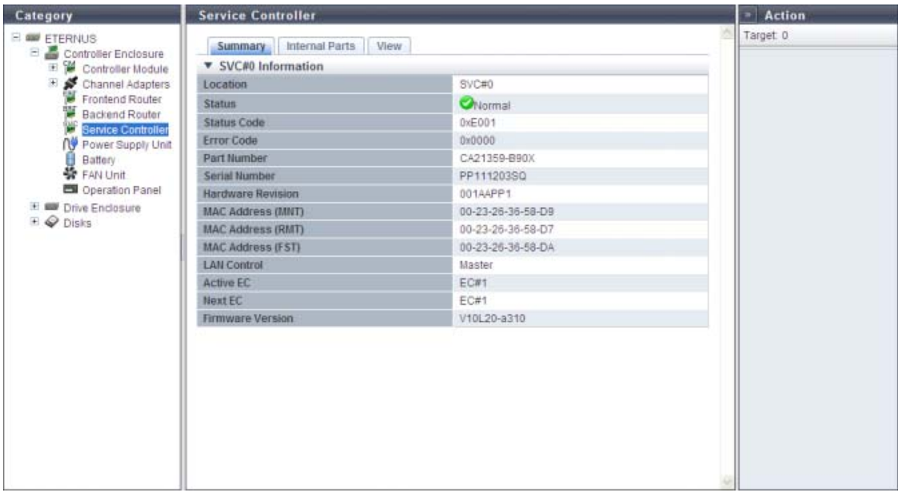
- Status
  The BRT EXP status is displayed. Refer to "B.5 Component Status" (page 977) for details.

- Status Code
  The status code of BRT EXP is displayed.
- Error Code
  The error code of BRT EXP is displayed.
- Active EC
  The Edition Control (EC) number of the currently running firmware is displayed.
- Next EC
  The EC number of the firmware that is to be run at the next power-on is displayed.
- Firmware Version
  The current controller firmware version is displayed.

10.1.10 Service Controller Detail

The detailed information of the SVC is displayed.

Summary

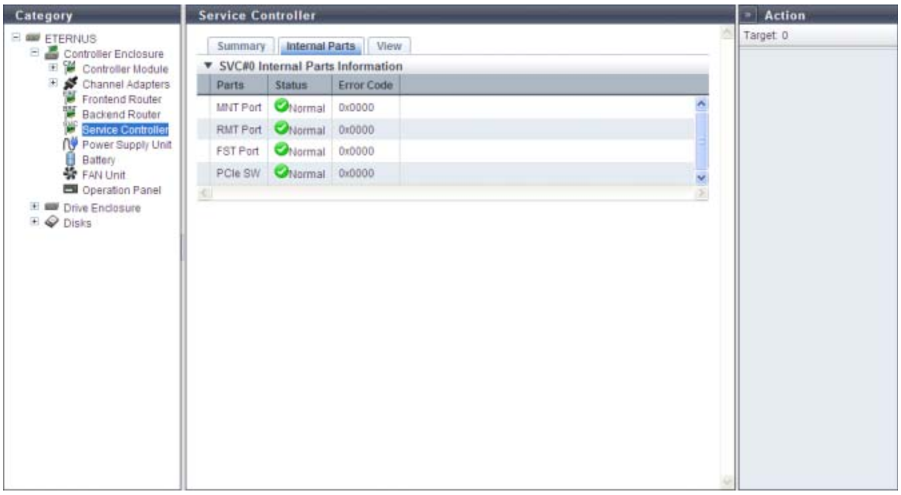


The following items are displayed in the Main area:

- Location
  The SVC number is displayed.
- Status
  The SVC status is displayed. Refer to "B.5 Component Status" (page 977) for details.
- Status Code
  The SVC status code is displayed.
- Error Code
  The SVC error code is displayed.
- Part Number
  The part number of the SVC is displayed.
- Serial Number
  The serial number of the SVC is displayed.

- Hardware Revision
  The hardware version of the SVC is displayed.
- MAC Address (MNT)
  The MAC address of the MNT Port is displayed.
- MAC Address (RMT)
  The MAC address of the RMT Port is displayed.
- MAC Address (FST)
  The MAC address of the FST Port is displayed.
- LAN Control
  The role of the LAN in the SVC is displayed.
  - Master
    When the SVC is connected to the Master CM, "Master" is displayed.
  - Slave
    When the SVC is connected to the Slave CM, "Slave" is displayed.
- Active EC
  The Edition Control (EC) number of the currently running firmware is displayed.
- Next EC
  The EC number of the firmware that is to be run at the next power-on is displayed.
- Firmware Version
  The current controller firmware version is displayed.

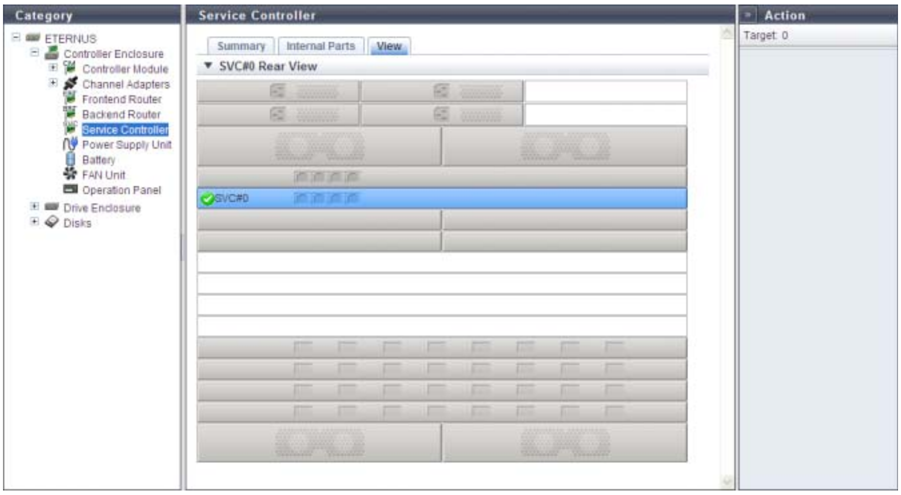
Internal Parts



The following items are displayed in the Main area:

- Parts
  The part name is displayed.
- Status
  The part status is displayed. Refer to "B.5 Component Status" (page 977) for details.
- Error Code
  The part error code is displayed.

View



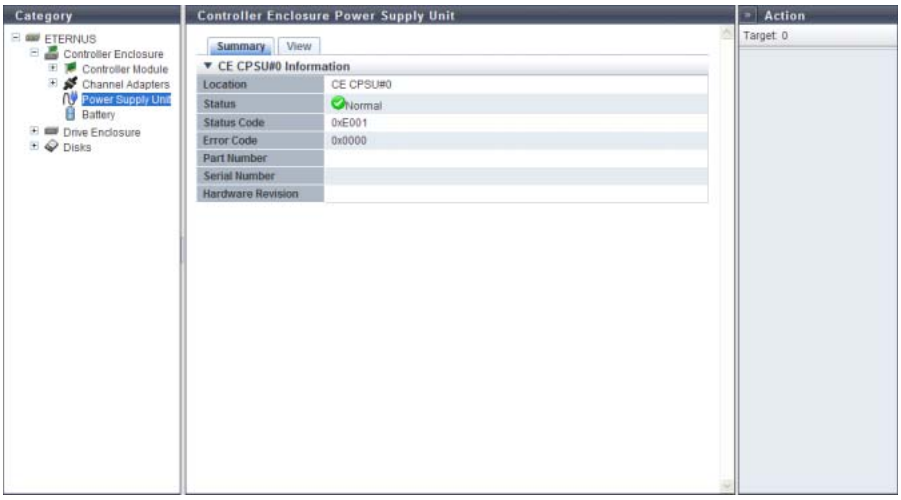
The following items are displayed in the Main area:

- Device image
  The rear view of the CE that is installed in the ETERNUS DX Disk storage system is displayed.
  Components that are not the target SVC are grayed out.
  The SVC status is displayed with an icon. Refer to "B.5 Component Status" (page 977) for details.

10.1.11 PSU/CPSU (CE) Detail

The detailed information for the PSU or the CPSU is displayed.

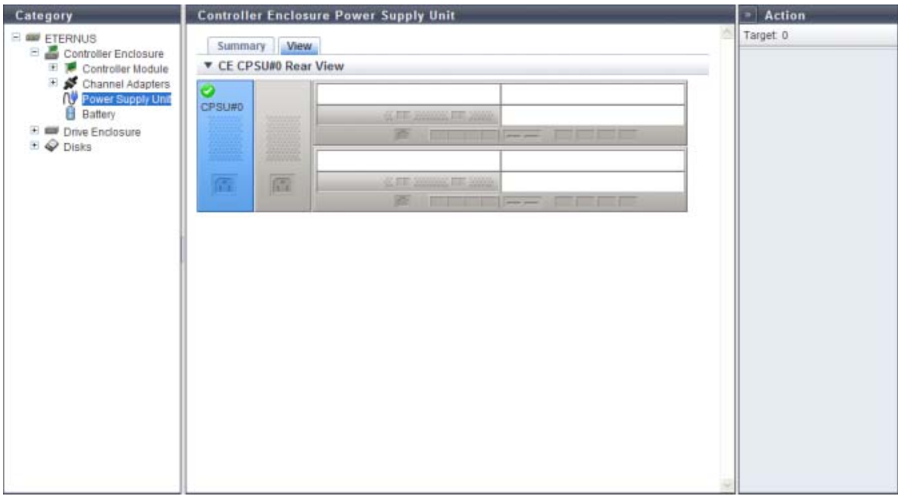
Summary



The following items are displayed in the Main area:

- Location
  The installation location of PSU or the CPSU is displayed.
- Status
  The PSU status or the CPSU status is displayed. Refer to "B.5 Component Status" (page 977) for details.
- Status Code
  The status code of PSU or CPSU is displayed.
- Error Code
  The error code of PSU or CPSU is displayed.
- Part Number
  The part number of PSU or CPSU is displayed.
- Serial Number
  The serial number of PSU or CPSU is displayed.
- Hardware Revision
  The hardware version of PSU or CPSU is displayed.

View



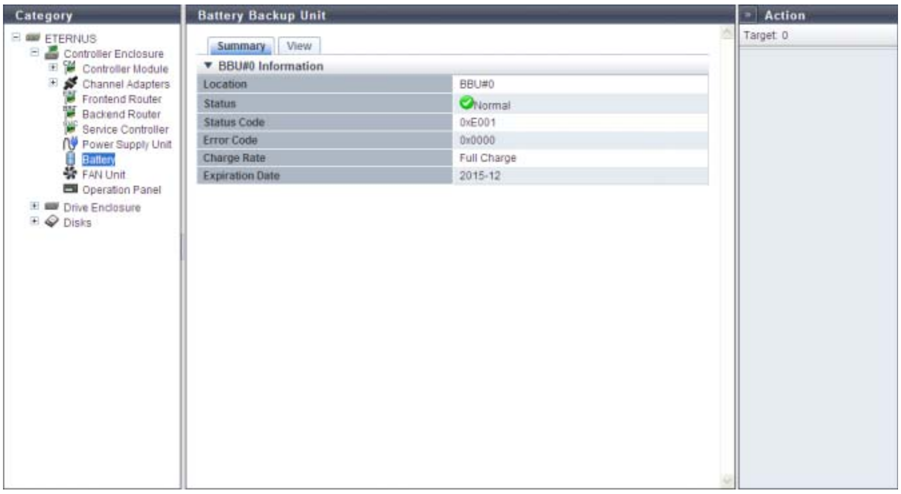
The following items are displayed in the Main area:

- Device image
  The rear view of the CE that is installed in the ETERNUS DX Disk storage system is displayed.
  Components that are not PSUs or CPSUs are grayed out.
  The PSU status or the CPSU status is displayed with an icon. Refer to "B.5 Component Status" (page 977) for details.

10.1.12 Battery Backup Unit Detail

The detailed information of the Battery Backup unit is displayed.

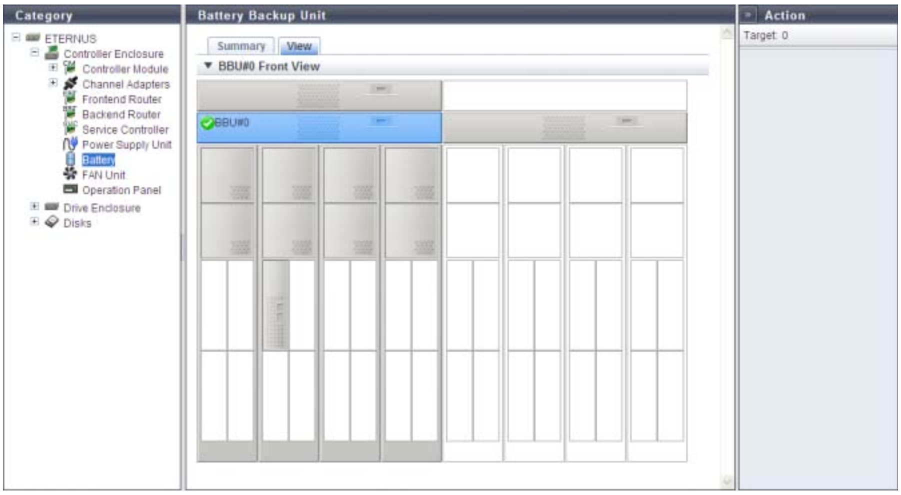
Summary



The following items are displayed in the Main area:

- Location
  The BBU number is displayed.
- Status
  The BBU status is displayed. Refer to "B.5 Component Status" (page 977) for details.
- Status Code
  The BBU unit status code is displayed.
- Error Code
  The BBU error code is displayed.
- Charge Rate
  The BBU charge rate is displayed.
  When the battery charge level is 90% or more, "Full Charge" is displayed. When the battery charge level is less than 90%, "xx%" is displayed.
- Expiration Date
  The expiration date for the BBU is displayed.

View



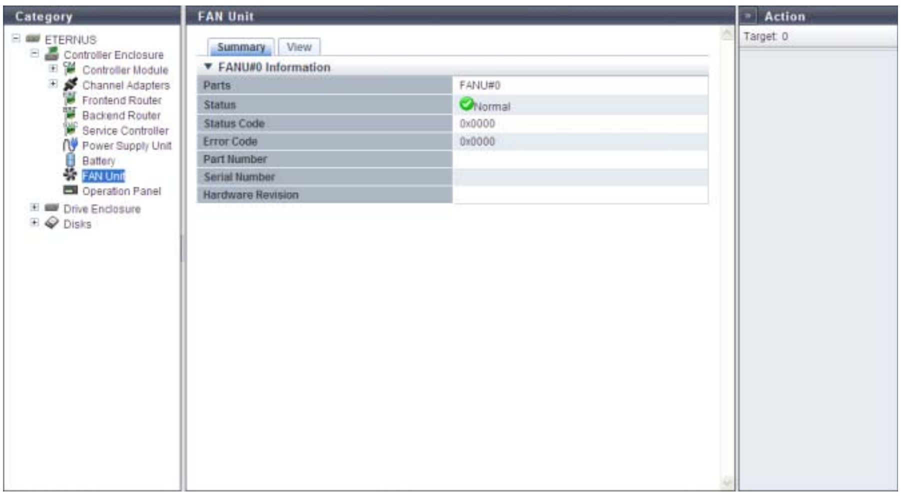
The following items are displayed in the Main area:

- Device image
  The front view of the CE that is installed in the ETERNUS DX Disk storage system is displayed.
  Components that are not the target BBU are grayed out.
  The BBU status is displayed with an icon. Refer to "B.5 Component Status" (page 977) for details.

10.1.13 FAN Unit Detail

The detailed information of the FAN unit is displayed.

Summary



The following items are displayed in the Main area:

- Parts
  The FAN unit number is displayed.
- Status
  The FAN unit status is displayed. Refer to "B.5 Component Status" (page 977) for details.
- Status Code
  The FAN unit status code is displayed.
- Error Code
  The FAN unit error code is displayed.
- Part Number
  The part number of the FAN unit is displayed.
- Serial Number
  The serial number of the FAN unit is displayed.
- Hardware Revision
  The hardware version of the FAN unit is displayed.

View



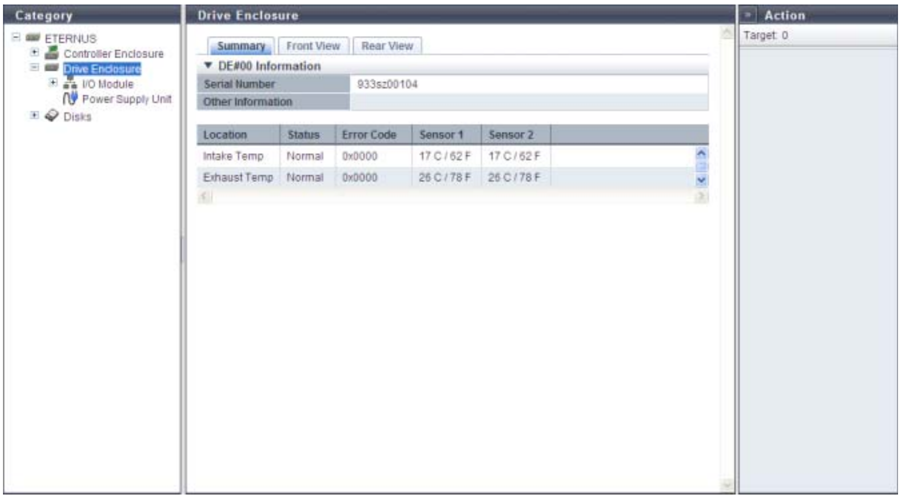
The following items are displayed in the Main area:

- Device image
  The rear view of the CE that is installed in the ETERNUS DX Disk storage system is displayed.
  Components that are not the target FAN unit are grayed out.
  The FAN unit status is displayed with an icon.
  Refer to "B.5 Component Status" (page 977) for details.

10.1.14 Drive Enclosure Detail

The detailed information of the DE is displayed.

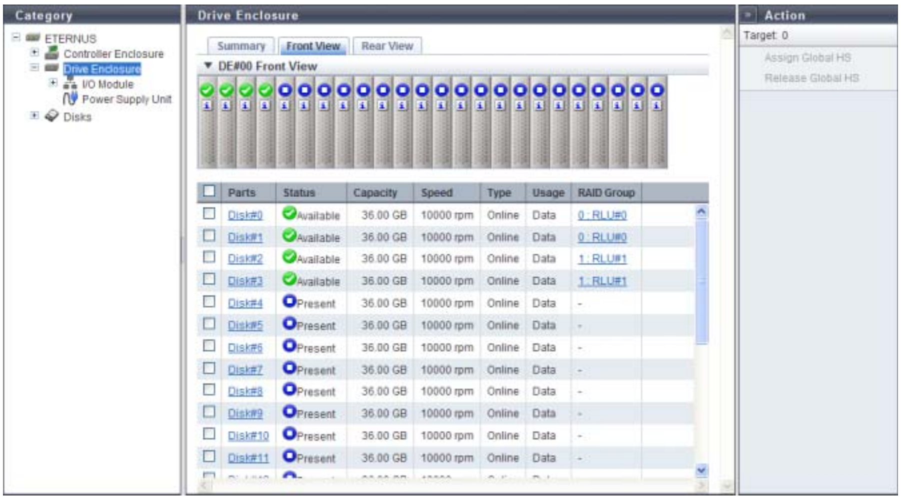
Summary



The following items are displayed in the Main area:

- Serial Number
  The serial number of the DE is displayed.
- Other Information
  Additional information for the DE is displayed.
- Location
  The installation location of the thermal sensor is displayed.
  - Intake Temp
  - Exhaust Temp
- Status
  The thermal sensor status is displayed.
- Error Code
  The error code for thermal sensor is displayed.
- Sensor 1
  The internal temperature of the IOM#0 is displayed in Celsius (C) and in Fahrenheit (F).
  If the thermal information is not available due to problem such as a sensor failure, a "-" (hyphen) is displayed.
- Sensor 2
  The internal temperature of the IOM#1 is displayed in Celsius (C) and in Fahrenheit (F).
  If the thermal information is not available due to problem such as a sensor failure, a "-" (hyphen) is displayed.

Front View



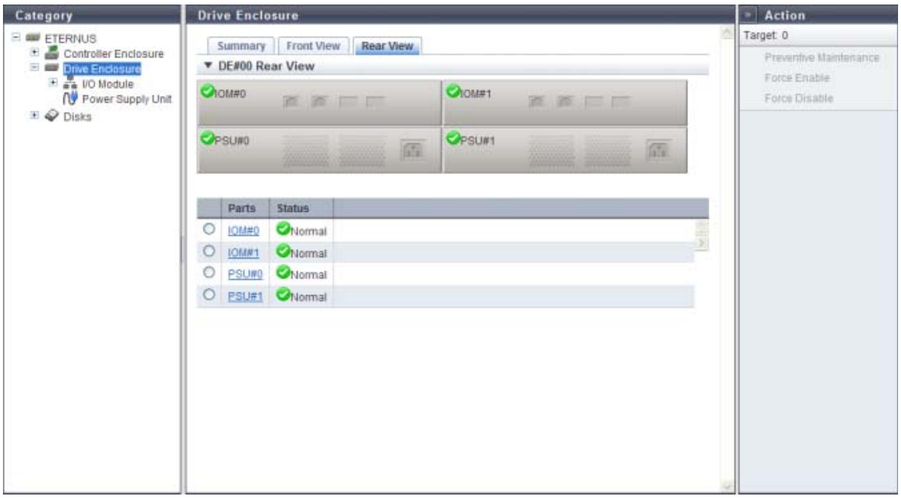
The following items are displayed in the Main area:

- Device image
  The front view of the DEs that are installed in the ETERNUS DX Disk storage system is displayed.
  - For 2.5-inch models: 24 (24 drives are lined up horizontally)
  - For 3.5-inch models: 12 (3 drives are lined up vertically and 4 drives are lined up horizontally)
  - When no drives are installed: Blank

  The drive status is displayed with an icon. Refer to "B.5 Component Status" (page 977) for details.
  By clicking this item, the [Disks] screen is displayed. Refer to "10.1.17 Disks Detail" (page 675) for details.
- Parts
  The drive number is displayed.
  By clicking this item, the [Disks] screen is displayed. Refer to "10.1.17 Disks Detail" (page 675) for details.
- Status
  The drive status is displayed. Refer to "B.5 Component Status" (page 977) for details.
- Capacity
  The capacity of the drive is displayed.
- Speed
  The drive speed is displayed. For SSDs, a "-" (hyphen) is displayed.
  - 15000 rpm
  - 10000 rpm
  - 7200 rpm
- Type
  The drive type is displayed.
  - For SAS disks: Online
  - For Nearline SAS disks: Nearline
  - For SSDs: SSD
  - For SEDs: SED

- Usage
  The usage of the drive is displayed.
  - For a drive that is used for user data or an unused drive: Data
  - For a drive that is registered as a Global Hot Spare: Global Hot Spare
  - For a drive that is registered as a Dedicated Hot Spare: Dedicated Hot Spare
- RAID Group
  If the drive is registered in a RAID group, the RAID group name to which the drive belongs is displayed.
  By clicking this item, the [RAID Group Detail] screen is displayed.

Rear View



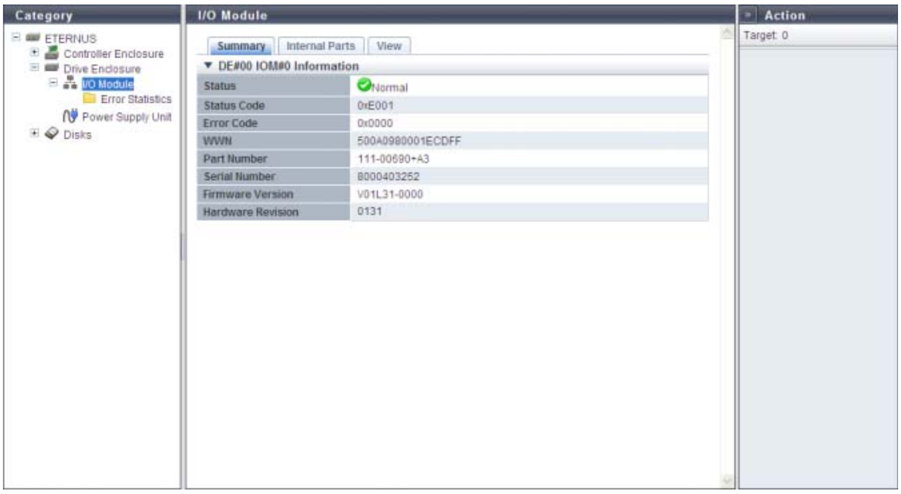
The following items are displayed in the Main area:

- Device image
  The rear view of the DE that is installed in the ETERNUS DX Disk storage system is displayed.
  The IOM status or the PSU status is displayed with an icon. Refer to "B.5 Component Status" (page 977) for details.
  By clicking the IOM number, the [I/O Module] screen is displayed. Refer to "10.1.15 I/O Module Detail" (page 672) for display items.
  By clicking the PSU number, the [Power Supply Unit] screen is displayed. Refer to "10.1.16 Power Supply Unit (DE) Detail" (page 674) for display items.
- Parts
  The IOM number or the PSU number is displayed.
  By clicking the IOM number, the [I/O Module] screen is displayed. Refer to "10.1.15 I/O Module Detail" (page 672) for display items.
  By clicking the PSU number, the [Power Supply Unit] screen is displayed. Refer to "10.1.16 Power Supply Unit (DE) Detail" (page 674) for display items.
- Status
  The status of IOM or PSU is displayed. Refer to "B.5 Component Status" (page 977) for details.

10.1.15 I/O Module Detail

The detailed information of IOM is displayed.

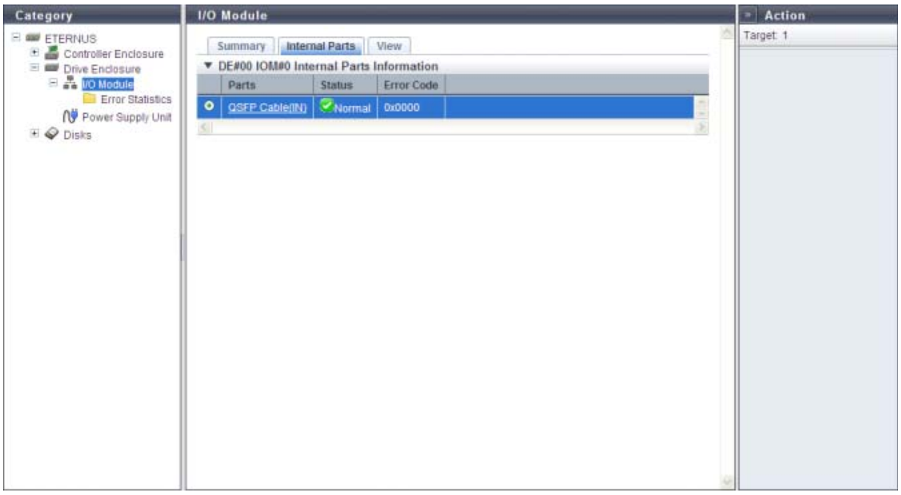
■ Summary



The following items are displayed in the Main area:

- Status
  The IOM status is displayed. Refer to "B.5 Component Status" (page 977) for details.
- Status Code
  The IOM status code is displayed.
- Error Code
  The IOM error code is displayed.
- WWN
  The IOM WWN is displayed.
- Part Number
  The IOM part number is displayed.
- Serial Number
  The serial number of the IOM is displayed.
- Firmware Version
  The current controller firmware version is displayed.

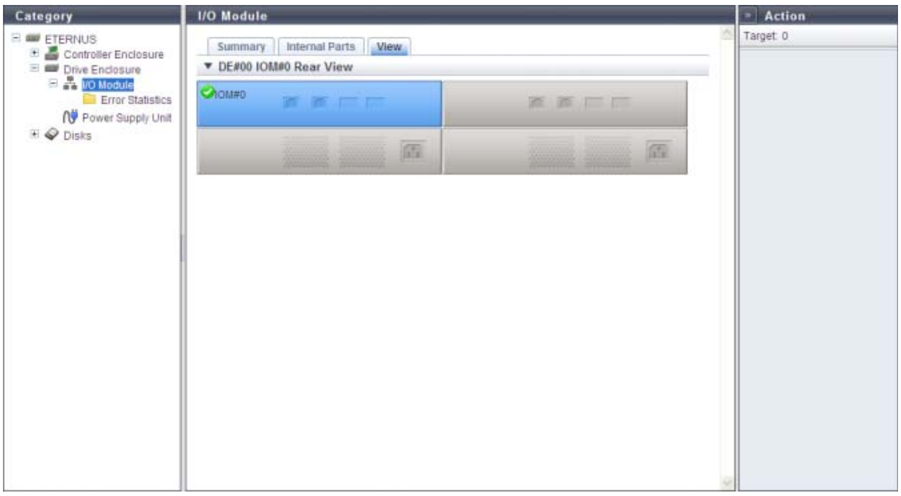
Internal Parts



The following items are displayed in the Main area:

- Parts
  The QSFP Cable (IN) or the QSFP Cable (OUT) is displayed. By clicking this item, the [QSFP Cable] screen is displayed. Refer to "10.1.18 QSFP Cable Detail" (page 678) for display items.
- Status
  The status for QSFP Cable (IN) or QSFP Cable (OUT) is displayed. Refer to "B.5 Component Status" (page 977) for details.
- Error Code
  The error code for QSFP Cable (IN) or QSFP Cable (OUT) is displayed.

View



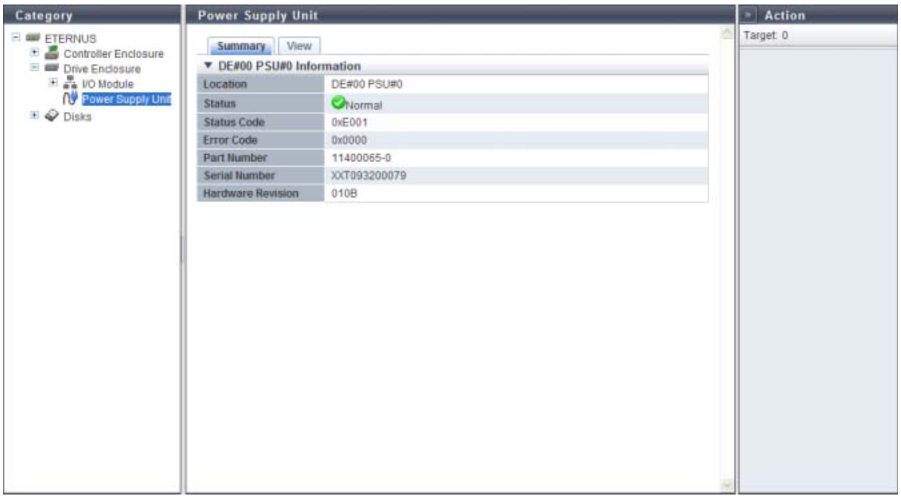
The following items are displayed in the Main area:

- Device image
  The rear view of the DE that is installed in the ETERNUS DX Disk storage system is displayed.
  Components that are not IOMs are grayed out.
  The IOM status is displayed with an icon. Refer to "B.5 Component Status" (page 977) for details.

10.1.16 Power Supply Unit (DE) Detail

The detailed information of PSU is displayed.

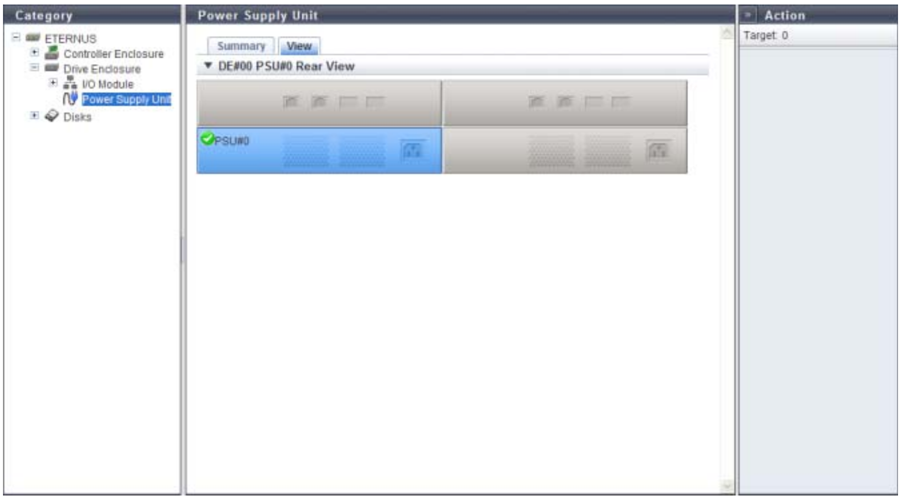
Summary



The following items are displayed in the Main area:

- Location
  The installation location of PSU is displayed.
- Status
  The PSU status is displayed. Refer to "B.5 Component Status" (page 977) for details.
- Status Code
  The PSU status code is displayed.
- Error Code
  The PSU error code is displayed.
- Part Number
  The PSU part number is displayed.
- Serial Number
  The PSU serial number is displayed.
- Hardware Revision
  The hardware version of the PSU is displayed.

View



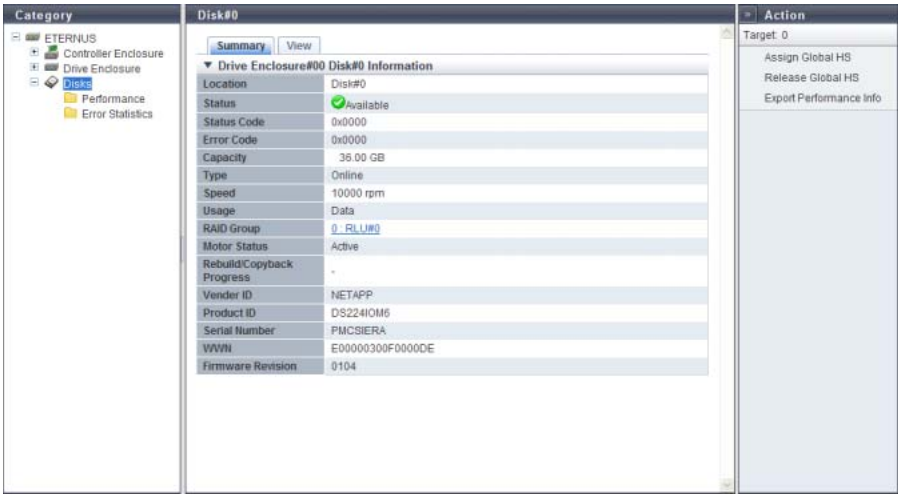
The following items are displayed in the Main area:

- Device image
  The rear view of the DE that is installed in the ETERNUS DX Disk storage system is displayed.
  Components that are not PSUs are grayed out.
  The PSU status is displayed with an icon. Refer to "B.5 Component Status" (page 977) for details.

10.1.17 Disks Detail

The detailed information of the drive is displayed.

Summary

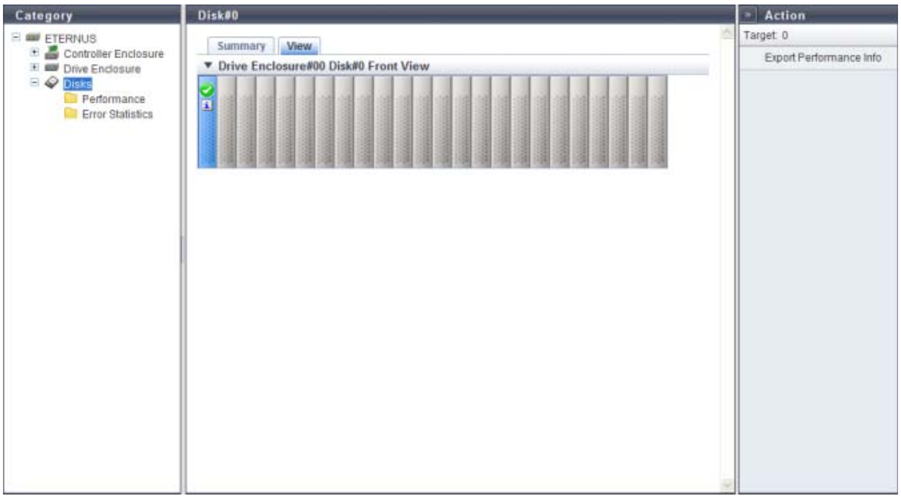


The following items are displayed in the Main area:

- Location
  The detailed information of the drive is displayed.
- Status
  The drive status is displayed. Refer to "B.5 Component Status" (page 977) for details.
- Status Code
  The drive status code is displayed.
- Error Code
  The drive error code is displayed.
- Capacity
  The capacity of the drive is displayed.
- Type
  The drive type is displayed.
  - For SAS disks: Online
  - For Nearline SAS disks: Nearline
  - For SSDs: SSD
  - For SEDs: SED
- Speed
  The drive speed is displayed. For SSDs, a "-" (hyphen) is displayed.
  - 15000 rpm
  - 10000 rpm
  - 7200 rpm
- Usage
  The usage of the drive is displayed.
  - Data
  - Global Hot Spare
  - Dedicated Hot Spare
- RAID Group
  If the drive is registered in the RAID group, the RAID group number and the RAID group name to which the drive belongs is displayed.
  By clicking this item, the [RAID Group Detail] screen is displayed.
- Motor Status
  The drive motor status is displayed.
  - "Active" status is displayed during operation of the storage system
  - "In the Boot Process" status is displayed during operation of the storage system
  - "Idle" status is displayed when the storage system is not running
  - "In the Stop Process" is displayed when the storage system is in the process of stopping
- Rebuild/Copyback Progress
  When rebuild or copyback is being performed, the progress ratio is displayed.
  When rebuild or copyback is being performed, the progress ratio is displayed.
- Vendor ID
  The drive manufacturer name is displayed.

- Product ID
  The drive manufacturer name is displayed.
- Serial Number
  The serial number of the drive is displayed.
- WWN
  The drive WWN is displayed.
- Firmware Version
  The drive firmware version is displayed.

View



The following items are displayed in the Main area:

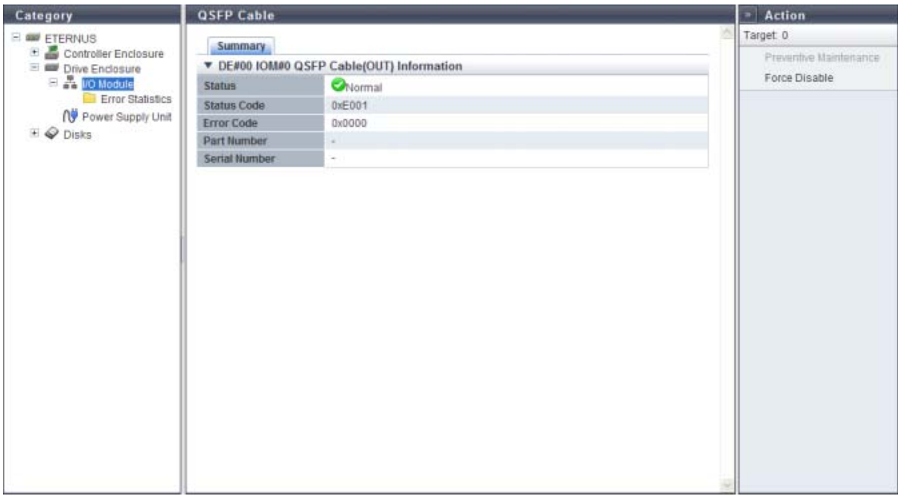
- Device image
  The front view of the DE that are installed in the ETERNUS DX Disk storage system is displayed.
  - For 2.5-inch drives: 24 (24 drives are lined up horizontally)
  - For 3.5-inch drives: 12 (3 drives are lined up vertically and 4 drives are lined up horizontally)
  - When no drives are installed: Blank

  Drives that are not selected in the [Drives] screen are grayed out.
  The drive status is displayed with an icon. Refer to "B.5 Component Status" (page 977) for details.

10.1.18 QSFP Cable Detail

The detailed information of the QSFP cable is displayed.

Summary



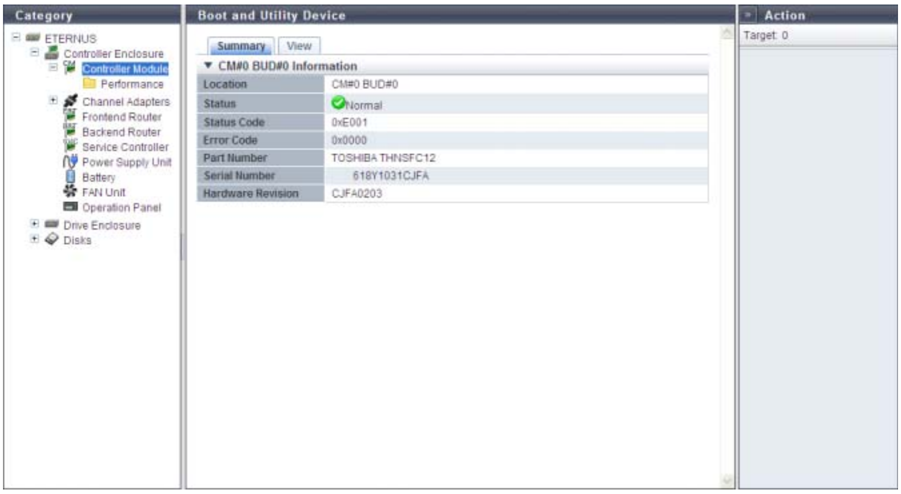
The following items are displayed in the Main area:

- Status
  The QSFP cable status is displayed. Refer to "B.5 Component Status" (page 977) for details.
- Status Code
  The QSFP cable status code is displayed.
- Error Code
  The QSFP cable error code is displayed.
- Part Number
  The QSFP cable number is displayed.
- Serial Number
  The QSFP cable serial number is displayed.

10.1.19 Boot and Utility Device Detail

The detailed information of the Boot and Utility Device (BUD) is displayed.

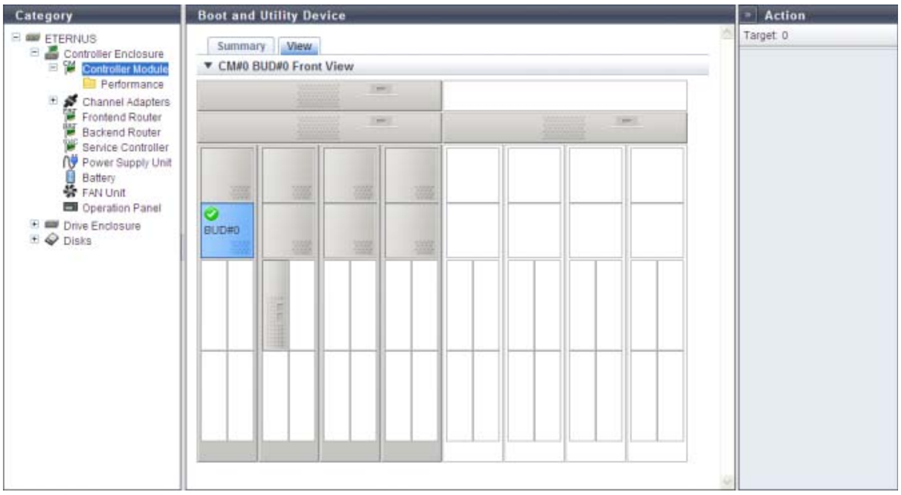
Summary



The following items are displayed in the Main area:

- Location
  The BUD number is displayed.
- Status
  The BUD status is displayed. Refer to "B.5 Component Status" (page 977) for details.
- Status Code
  The BUD status code is displayed.
- Error Code
  The BUD error code is displayed.
- Part Number
  The BUD part number is displayed.
- Serial Number
  The BUD serial number is displayed.
- Hardware Revision
  The hardware version of the BUD is displayed.

View

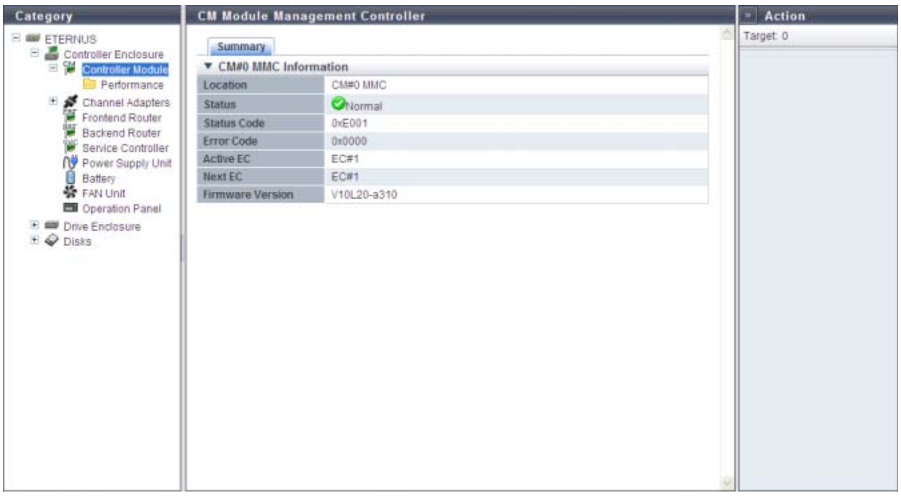


The following items are displayed in the Main area:

- Device image
  The rear view or the front view of the CE that is installed in the ETERNUS DX Disk storage system is displayed.
  For the ETERNUS DX8100 S2, the rear view is displayed.
  For the ETERNUS DX8700 S2, the front view is displayed.
  Components that are not BUDs are grayed out.
  The BUD status is displayed with an icon. Refer to "B.5 Component Status" (page 977) for details.

10.1.20 CM Module Management Controller Detail

The detailed information of the CM Module Management Controller (CM MMC) is displayed.



The following items are displayed in the Main area:

- Location
  The CM MMC number is displayed.
- Status
  The CM MMC status is displayed. Refer to "B.5 Component Status" (page 977) for details.

- Status Code
  The CM MMC status code is displayed.
- Error Code
  The CM MMC error code is displayed.
- Active EC
  The Edition Control (EC) number of the currently running firmware is displayed.
- Next EC
  The EC number of the firmware that is to be run at the next power-on is displayed.
- Hardware Revision
  The hardware version of the CM MMC is displayed.

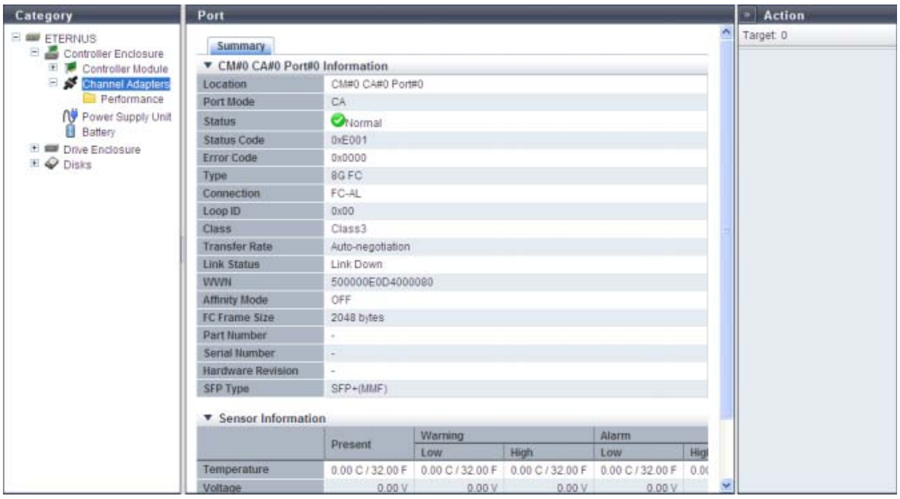
10.1.21 Port Detail

The detailed information of the port is displayed. Display items vary depending on the port type ("FC port" (page 681), "iSCSI port" (page 687), "SAS port" (page 690), or "FCoE port" (page 691)).

Summary

FC port

The detailed FC port information is displayed.



The following items are displayed in the Main area:

■ CM#x CA#y Port#z Information

- Location
  The location information of the port is displayed.
  - CM#x CA#y Port#z (x: CM number, y: CA number, z: Port number)
- Port Mode
  The port mode is displayed.
  - CA
  - RA
  - CA/RA
  - Initiator
- Status
  The port status is displayed. Refer to "B.5 Component Status" (page 977) for details.
- Status Code
  The port status code is displayed.
- Error Code
  The port error code is displayed.
- Type
  The port type is displayed.
  - 8G FC
  - 16G FC
- Connection
  The connection type of the port is displayed.
  - Fabric
    A connection type that enables simultaneous communication among multiple nodes through a Fibre Channel switch. This connection type can also be used for a direct connection when "Transfer Rate" is "16 Gbit/s".
  - FC-AL
    A connection type that connects multiple nodes in a loop.
- Loop ID
  If the connection type of the target port is "FC-AL", the Loop ID is displayed.
  When the Loop ID is manually specified, the ID that is to be set for the port is displayed in hexadecimal.
  When the Loop ID is automatically specified, "Ascending" or "Descending" is displayed.
  When the "Connection" is "Fabric", a "-" (hyphen) is displayed.
- Class
  The service class of the port (fixed to "Class3") is displayed.
- Transfer Rate
  The transfer speed of the port is displayed.
  If the status is " Unknown", a "-" (hyphen) is displayed.
  - Auto-negotiation
  - 1 Gbit/s
  - 2 Gbit/s
  - 4 Gbit/s
  - 8 Gbit/s
  - 16 Gbit/s

- Link Status
  The link status of the port is displayed.
  If the status is "? Unknown", a "-" (hyphen) is displayed.
  - Link Down
  - 1 Gbit/s Link Up
  - 2Gbit/s Link Up
  - 4Gbit/s Link Up
  - 8Gbit/s Link Up
  - 16Gbit/s Link Up
- WWN
  The WWN of the port is displayed.
  "WWN" is displayed when the port mode is "CA", "RA", or "CA/RA".
  If the port mode is "Initiator", the display status varies according to the screen. A "-" (hyphen) is displayed for the CM#x CA#y port information in the [Channel Adapter Detail] screen. This item is not displayed in the [Port Detail] screen.
- WWN (Port Name)
  The WWPN of the port is displayed.
  "WWN (Port Name)" is displayed when the port mode is "Initiator".
  If the port mode is not "Initiator", the display status varies according to the screen. A "-" (hyphen) is displayed for the CM#x CA#y port information in the [Channel Adapter Detail] screen. This item is not displayed in the [Port Detail] screen.
- WWN (Node Name)
  The WWNN of the port is displayed.
  "WWN (Node Name)" is displayed when the port mode is "Initiator".
  If the port mode is not "Initiator", the display status varies according to the screen. A "-" (hyphen) is displayed for the CM#x CA#y port information in the [Channel Adapter Detail] screen. This item is not displayed in the [Port Detail] screen.
- Affinity Mode
  The affinity mode of the port is displayed.
  - ON
  - OFF
- FC Frame Size
  The frame size of the port is displayed.
  - 512 byte
  - 1024 byte
  - 2048 byte
- Part Number
  The part number of the port is displayed.
  If the part number cannot be acquired, a "-" (hyphen) is displayed.
- Serial Number
  The serial number of the port is displayed.
  If the serial number cannot be acquired, a "-" (hyphen) is displayed.
- Hardware Revision
  The hardware version of the port is displayed.
  If the hardware version cannot be acquired, a "-" (hyphen) is displayed.

- SFP Type
  The SFP type of the port is displayed. If the SFP is not installed, "Unmount" is displayed.
  - Shortwave: 4G ShortWave
  - SFP+(SMF): 8G LongWave
  - SFP+(MMF): 8G SFP+
  - 16G SFP+(SMF): 16G LongWave
  - 16G SFP+(MMF): 16G SFP+
  - Unknown: SFP type other than above
- Temperature
  The real time temperature of the SFP in the port is displayed in Celsius (C) and in Fahrenheit (F).
  When the information cannot be obtained, a "-" (hyphen) is displayed.
  - x C / y F (x: -128.00 to 128.00, y: -198.40 to 262.40)
- Voltage
  The real time voltage of the SFP in the port is displayed.
  When the information cannot be obtained, a "-" (hyphen) is displayed.
  - x V (x: 0.00 to 6.55)
- Current
  The real time current of the SFP in the port is displayed.
  When the information cannot be obtained, a "-" (hyphen) is displayed.
  - x mA (x: 0.00 to 131.00)
- TX Power
  The real time transmission power of the SFP in the port is displayed.
  When the information cannot be obtained, a "-" (hyphen) is displayed.
  - x mW (x: 0.00 to 6.55)
- RX Power
  The real time received power of the SFP in the port is displayed.
  When the information cannot be obtained, a "-" (hyphen) is displayed.
  - x mW (x: 0.00 to 6.55)

Note

"Temperature", "Voltage", "Current", "TX Power", and "RX Power" are displayed as the CM#x CA#y port information in "10.1.6 Channel Adapter Detail" (page 655). In this screen, "Sensor Information" is displayed.

■ Sensor Information

The real time and threshold values (Low/High) for the temperature, voltage, current, transmission power, and received power are displayed in the Sensor Information.
When the information cannot be obtained, a "-" (hyphen) is displayed.
The target components for this information are FC that have SFPs from which information can be obtained.

Note

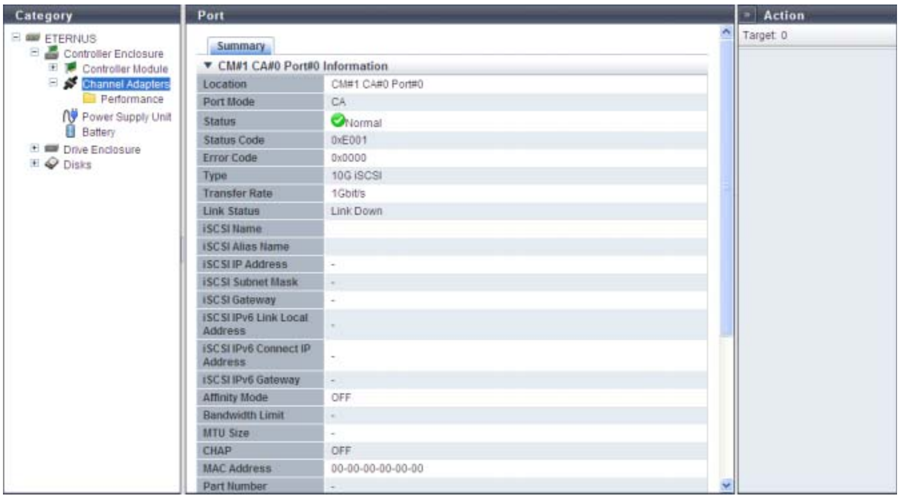
- An SFP is regarded as being in Warning status when the real time value is lower than the Warning threshold (Low) and higher than the Alarm threshold (Low).
- An SFP is regarded as being in Warning status when the real time value is higher than the Warning threshold (High) and lower than the Alarm threshold (High).
- An SFP is regarded as being in Alarm status when the real time value is lower than the Alarm threshold (Low) or higher than the Alarm threshold (High).

- Temperature
  - Present
    The real time temperature of the SFP in the port is displayed.
    - x C / y F (x: -128.00 to 128.00, y: -198.40 to 262.40)
  - Warning
    - Low or High
      The Warning threshold (Low/High) for the temperature of the SFP in the port is displayed.
      - x C / y F (x: -128.00 to 128.00, y: -198.40 to 262.40)
  - Alarm
    - Low or High
      The Alarm threshold (Low/High) for the temperature of the SFP in the port is displayed.
      - x C / y F (x: -128.00 to 128.00, y: -198.40 to 262.40)
- Voltage
  - Present
    The real time voltage of the SFP in the port is displayed.
    - x V (x: 0.00 to 6.55)
  - Warning
    - Low or High
      The Warning threshold (Low/High) for the voltage of the SFP in the port is displayed.
      - x V (x: 0.00 to 6.55)
  - Alarm
    - Low or High
      The Alarm threshold (Low/High) for the voltage of the SFP in the port is displayed.
      - x V (x: 0.00 to 6.55)

- Current
    - Present
      The real time current of the SFP in the port is displayed.
        - x mA (x: 0.00 to 131.00)
    - Warning
        - Low or High
          The Warning threshold (Low/High) for the current of the SFP in the port is displayed.
            - x mA (x: 0.00 to 131.00)
    - Alarm
        - Low or High
          The Alarm threshold (Low/High) for the current of the SFP in the port is displayed.
            - x mA (x: 0.00 to 131.00)
- TX Power
    - Present
      The real time transmission power of the SFP in the port is displayed.
        - x mW (x: 0.00 to 6.55)
    - Warning
        - Low or High
          The Warning threshold (Low/High) for the transmission power of the SFP in the port is displayed.
            - x mW (x: 0.00 to 6.55)
    - Alarm
        - Low or High
          The Alarm threshold (Low/High) for the transmission power of the SFP in the port is displayed.
            - x mW (x: 0.00 to 6.55)
- RX Power
    - Present
      The real time received power of the SFP in the port is displayed.
        - x mW (x: 0.00 to 6.55)
    - Warning
        - Low or High
          The Warning threshold (Low/High) for the received power of the SFP in the port is displayed.
            - x mW (x: 0.00 to 6.55)
    - Alarm
        - Low or High
          The Alarm threshold (Low/High) for the received power of the SFP in the port is displayed.
            - x mW (x: 0.00 to 6.55)

iSCSI port

The detailed iSCSI port information is displayed.



The following items are displayed in the Main area:

■ CM#x CA#y Port#z Information

- Location
  The location information of the port is displayed.
  - CM#x CA#y Port#z (x: CM number, y: CA number, z: Port number)
- Port Mode
  The port mode is displayed.
  - CA
  - RA
  - CA/RA
- Status
  The port status is displayed. Refer to "B.5 Component Status" (page 977) for details.
- Status Code
  The port status code is displayed.
- Error Code
  The port error code is displayed.
- Type
  The type of the port is displayed.
  - 1G iSCSI
  - 10G iSCSI
  - iSCSI-RA
- Transfer Rate
  The transfer speed of the port is displayed.
  If the status is " Unknown", a "-" (hyphen) is displayed.
  - Auto-negotiation
  - 100Mbit/s
  - 1Gbit/s
  - 10Gbit/s

- Link Status
  The link status of the port is displayed.
  If the status is "? Unknown", a "-" (hyphen) is displayed.
  - Link Down
  - 100Mbit/s Link Up
  - 1Gbit/s Link Up
  - 10Gbit/s Link Up
- iSCSI Name
  The iSCSI name is displayed.
- iSCSI Alias Name
  The iSCSI Alias name is displayed.
- iSCSI IP Address
  The IPv4 address of the iSCSI is displayed.
  If not specified, a "-" (hyphen) is displayed.
- iSCSI Subnet Mask
  The subnet mask of the iSCSI is displayed.
  If not specified, a "-" (hyphen) is displayed.
- iSCSI Gateway
  The IPv4 address of the iSCSI gateway is displayed.
  If not specified, a "-" (hyphen) is displayed.
- iSCSI IPv6 Link Local Address
  The IPv6 link local address of the iSCSI is displayed.
  Note that the IPv6 address is displayed as an abbreviation. If not specified, a "-" (hyphen) is displayed.
  - IPv6 address
    fe80::xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (hexadecimal, "a" - "f" are lowercase letters)
    Refer to "IPv6 Address Notation" (page 378) for details.
- iSCSI IPv6 Connect IP Address
  The IPv6 connect IP address of the iSCSI is displayed.
  Note that the IPv6 address is displayed as an abbreviation. If not specified, a "-" (hyphen) is displayed.
  - IPv6 address
    xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (hexadecimal, "a" - "f" are lowercase letters)
    Refer to "IPv6 Address Notation" (page 378) for details.
- iSCSI IPv6 Gateway
  The gateway IPv6 address of the target port is displayed.
  Note that the IPv6 address is displayed as an abbreviation. If not specified, a "-" (hyphen) is displayed.
  - IPv6 address
    xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (hexadecimal, "a" - "f" are lowercase letters)
    Refer to "IPv6 Address Notation" (page 378) for details.
- Affinity Mode
  The affinity mode of the port is displayed.
  - ON
  - OFF

- Bandwidth Limit
  The bandwidth limit of the iSCSI is displayed between 10Mbit/s - 400Mbit/s.
  A "-" (hyphen) is displayed in the following conditions:
  - When the Bandwidth Limit is "0"
  - When the "Type" is "1G iSCSI " or "10G iSCSI"
- MTU Size
  The MTU size of the iSCSI is displayed.
  - When the "Type" is "1G iSCSI" or "10G iSCSI": 576 - 9000
  - When the "Type" is "iSCSI RA": 1000, 1050, 1100, 1150, 1200, 1250, 1300, 1350, 1400, or 1438

  When the MTU size is "0" or the port mode is "CA", a "-" (hyphen) is displayed.
- CHAP
  The CHAP authentication status is displayed.
  - When the "Port Mode" is "CA" or "RA": "ON" or "OFF"
  - When the "Port Mode" is "CA/RA": x / y
    x: CHAP authentication status for the CA port ("ON" or "OFF")
    y: CHAP authentication status for the RA port ("ON" or "OFF")
- MAC Address
  The MAC address of the port is displayed.
- Part Number
  The part number of the port is displayed.
  If the part number cannot be acquired, a "-" (hyphen) is displayed.
- Serial Number
  The serial number of the port is displayed.
  If the serial number cannot be acquired, a "-" (hyphen) is displayed.
- Hardware Revision
  The hardware version of the port is displayed.
  If the hardware version cannot be acquired, a "-" (hyphen) is displayed.
- SFP Type
  When the "Type" is "10G iSCSI", the SFP type of the port is displayed. If no SFP is installed, "Unmount" is displayed.
  If the "Type" is not "10G iSCSI", the display status varies according to the screen. A "-" (hyphen) is displayed for the CM#x CA#y port information in the [Channel Adapter Detail] screen. This item is not displayed in the [Port Detail] screen.
  - SFP+
  - SFP+ Copper
  - Unknown

Note

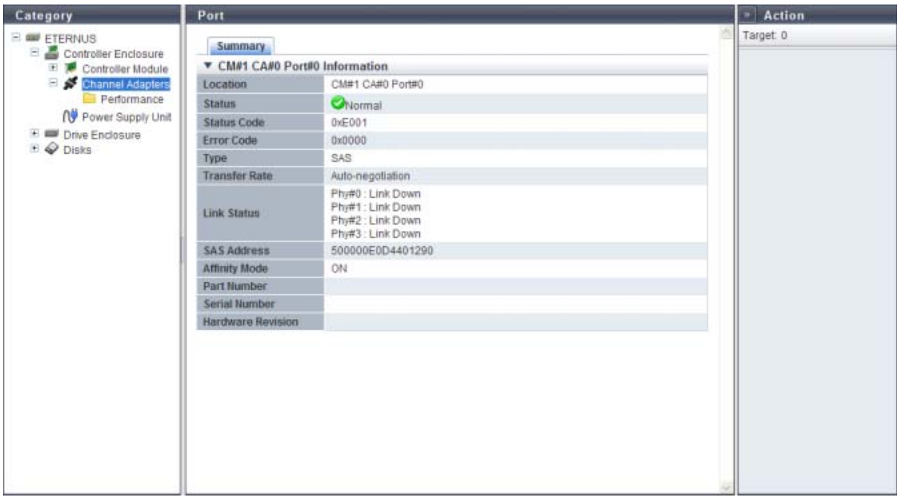
When the "Type" is "10G iSCSI", the temperature, voltage, current, transmission power, and received power for the SFP in the port are displayed.
Refer to "FC port" (page 681) for display items.

■ Sensor Information

The real time and threshold values (Low/High) for the temperature, voltage, current, transmission power, and received power are displayed in the Sensor Information.
When the information cannot be obtained, a "-" (hyphen) is displayed.
The target components for this information are 10 iSCSI that have SFPs from which information can be obtained.
Refer to "Sensor Information" (page 685) for display items.

SAS port

The detailed SAS port information is displayed.



The following items are displayed in the Main area:

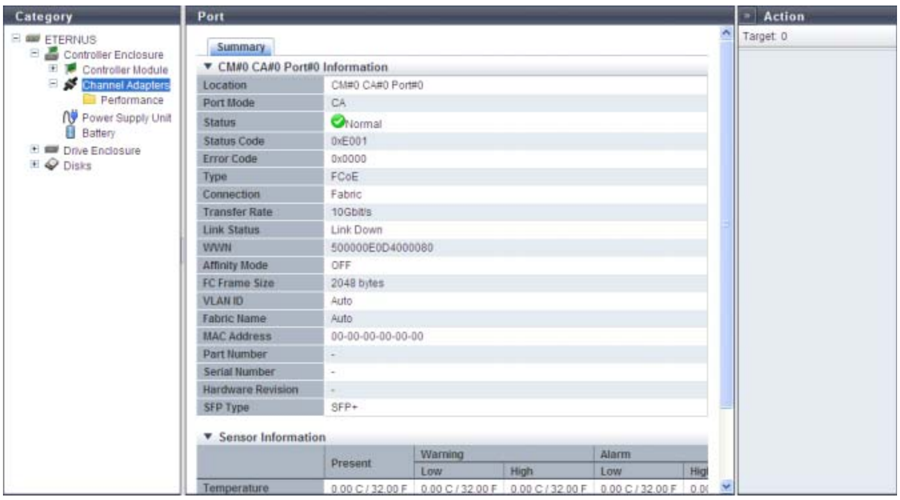
■ CM#x CA#y Port#z Information

- Location
  The location information of the port is displayed.
  - CM#x CA#y Port#z (x: CM number, y: CA number, z: Port number)
- Status
  The port status is displayed. Refer to "B.5 Component Status" (page 977) for details.
- Status Code
  The port status code is displayed.
- Error Code
  The port error code is displayed.
- Type
  The type of the port (fixed to "SAS") is displayed.
- Transfer Rate
  The transfer speed of the port is displayed.
  If the status is " Unknown", a "-" (hyphen) is displayed.
  - Auto-negotiation
  - 1.5 Gbit/s
  - 3 Gbit/s
  - 6 Gbit/s

- Link Status
  The link status for each Phy is displayed.
  If the status is "? Unknown", a "-" (hyphen) is displayed.
  - Phy#0 - 3:x
    "x" indicates one of the following statuses:
    - Link Down
    - 1.5Gbit/s Link Up
    - 3Gbit/s Link Up
    - 6Gbit/s Link Up
- SAS Address
  The SAS address is displayed.
  If not specified, a "-" (hyphen) is displayed.
- Affinity Mode
  The affinity mode of the port is displayed.
  - ON
  - OFF
- Part Number
  The part number is not displayed.
  If the part number cannot be acquired, a "-" (hyphen) is displayed.
- Serial Number
  The serial number is not displayed.
  If the serial number cannot be acquired, a "-" (hyphen) is displayed.
- Hardware Revision
  The hardware version is not displayed.
  If the hardware version cannot be acquired, a "-" (hyphen) is displayed.

FCoE port

The detailed FCoE port information is displayed.



The following items are displayed in the Main area:

■ CM#x CA#y Port#z Information

- Location
  The location information of the port is displayed.
  - CM#x CA#y Port#z (x: CM number, y: CA number, z: Port number)
- Port Mode
  The port mode (fixed to "CA") is displayed.
- Status
  The port status is displayed. Refer to "B.5 Component Status" (page 977) for details.
- Status Code
  The port status code is displayed.
- Error Code
  The port error code is displayed.
- Type
  The type of the port (fixed to "FCoE") is displayed.
- Connection
  The connection type of the port is displayed.
  - Fabric
    A connection type that enables simultaneous communication among multiple nodes through a Fibre Channel switch.
  - FC-AL
    A connection type that connects multiple nodes in a loop.
- Transfer Rate
  The transfer speed of the port (fixed to "10 Gbit/s") is displayed.
  If the status is "? Unknown", a "-" (hyphen) is displayed.
- Link Status
  The link status of the port is displayed.
  If the status is "? Unknown", a "-" (hyphen) is displayed.
  - Link Down
  - 10Gbit/s Link Up
- WWN
  The WWN of the port is displayed.
- Affinity Mode
  The affinity mode of the port is displayed.
  - ON
  - OFF
- FC Frame Size
  The frame size of the port is displayed.
  - 512 byte
  - 1024 byte
  - 2048 byte
- VLAN ID
  The VLAN ID is displayed.
  When the VLAN ID is manually specified, the VLAN ID is displayed between 0 - 4095.
  When the VLAN ID is automatically specified, "Auto" is displayed.

- Fabric Name
  The fabric name (WWN for FCoE) is displayed.
  When the fabric name is manually specified, the specified fabric name is displayed.
  When the fabric name is automatically specified, "Auto" is displayed.
- MAC Address
  The MAC address of the port is displayed.
- Part Number
  The part number of the port is displayed.
  If the part number cannot be acquired, a "-" (hyphen) is displayed.
- Serial Number
  The serial number of the port is displayed.
  If the serial number cannot be acquired, a "-" (hyphen) is displayed.
- Hardware Revision
  The hardware version of the port is displayed.
  If the hardware version cannot be acquired, a "-" (hyphen) is displayed.
- SFP Type
  The SFP type of the port is displayed. If the SFP is not installed, "Unmount" is displayed.
  - SFP+
  - SFP+ Copper
  - Unknown

Note

The temperature, voltage, current, transmission power, and received power for the SFP in the port are displayed.
Refer to "FC port" (page 681) for display items.

■ Sensor Information

The real time and threshold values (Low/High) for the temperature, voltage, current, transmission power, and received power are displayed in the Sensor Information.
When the information cannot be obtained, a "-" (hyphen) is displayed.
The target components for this information are FCoE that have SFPs from which information can be obtained.
Refer to "Sensor Information" (page 685) for display items

10.2 Functions in the Action Area for Component

When using functions in the Action area, select the desired function from the Action area that is displayed in the status display screen.
The functions in the Action area for Component can be performed from the following display functions:

Functions in the Action area for Component	Display function
Add Drive Enclosure	• Drive Enclosure
Turn on Locator Beacon/Turn off Locator Beacon	• Controller Enclosure
Add Channel Adapter Port	• All Channel Adapters
Assign Global Hot Spare	• Disks
Release Global Hot Spare	
Assign Dedicated Hot Spare	
Release Dedicated Hot Spare	
Export Performance Information	• Controller Module (Performance) • Channel Adapter Ports (Performance) • Disks (Performance)
Clear Disk Error Statistics (All Disks)	• Disk Error Statistics
Clear Disk Error Statistics (Selected Disks)	

10.2.1 Add Drive Enclosure

This function enables DEs to be added without stopping the ETERNUS DX Disk storage system.
Use GUI to install any DEs that are added.

Specify between DE#01 - DE#09 for the drive enclosures that are to be added.

Caution

- When logged in using a user account with the "Admin" default role, this function is available only with the ETERNUS DX80 S2/DX90 S2. To use this function with the ETERNUS DX410 S2/DX440 S2 or the ETERNUS DX8100 S2/DX8700 S2, a user account with the "Maintainer" default role (or "Maintenance Operation" policy) is required.
- Only one DE can be added at a time.
- 2.5-inch type DEs and 3.5-inch type DEs can be installed in the same ETERNUS DX Disk storage system.
- Be sure to use authorized expansion parts. If parts other than the expansion parts are used, operation is not guaranteed.
- This function cannot be used under the following conditions:
  - When the general status of the ETERNUS DX Disk storage system is other than "Normal"
  - When DE#09 is already installed (when the status of DE#09 is " Normal")

Note

- If expansion fails due to an error or problem, the expansion can be restarted from the interrupted point by starting this function again and recovering the failed expansion parts.
- DEs can be added regardless of whether drives are installed or not.

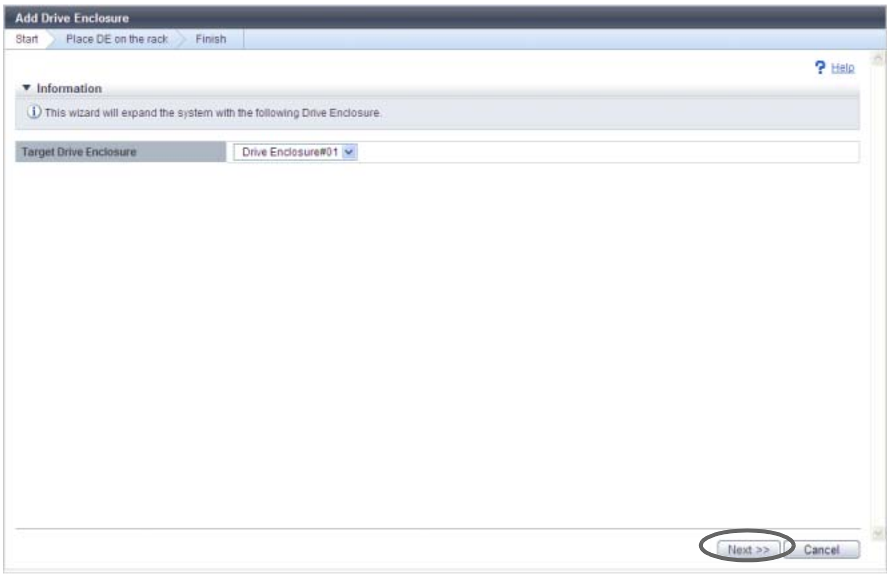
The procedure to expand a DE is as follows:

Procedure

1 Click [Add Drive Enclosure] in [Action].

→ The start screen appears.

2 Click the [Next >>] button.



The displayed screen may vary depending on whether the recovery process is required or not.

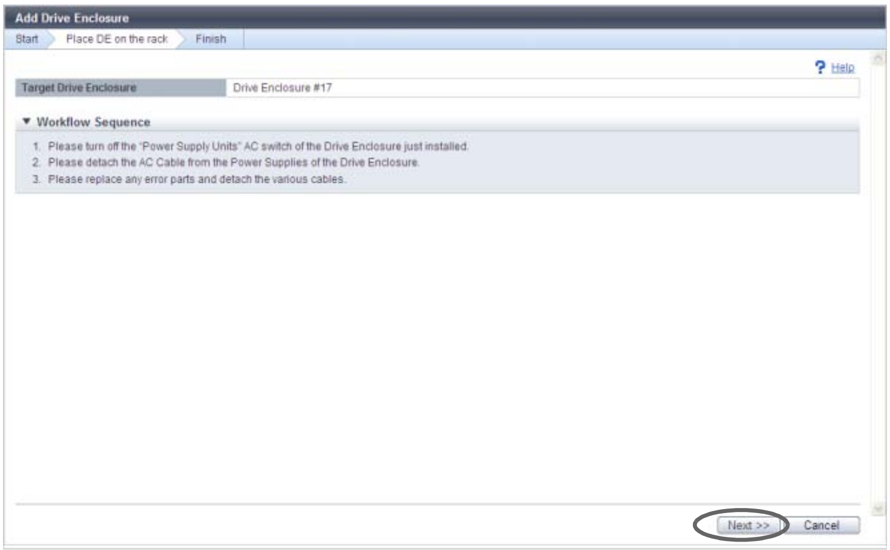
- When the recovery process is required

  → The [Recovery Procedure] screen appears. Proceed to Step 3.

- When the recovery process is not required

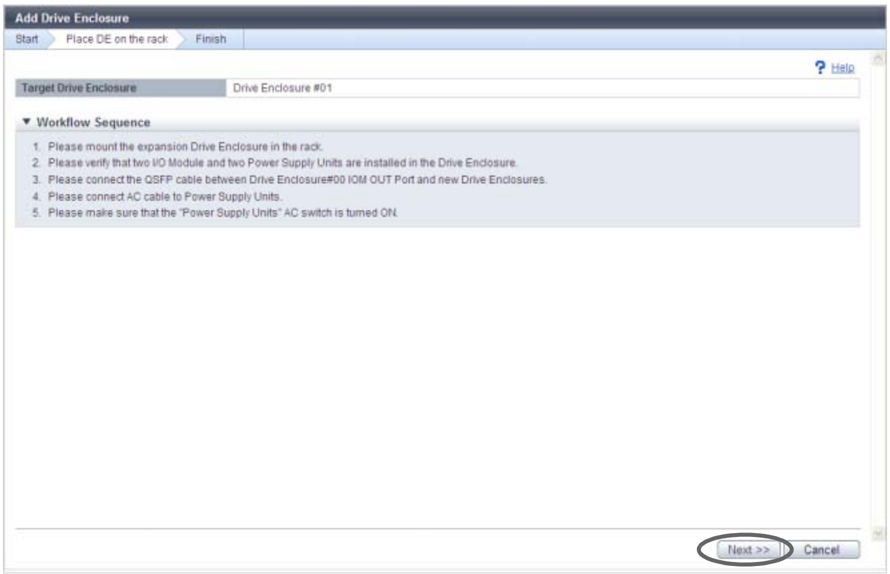
  → The [Place DE on the rack] screen appears. Proceed to Step 4.

3 Perform the recovery operation according to the displayed procedure. When the recovery operation is complete, click the [Next >>] button.



→ The [Place DE on the rack] screen appears.

4 Perform the DE expansion according to the displayed procedure, and click the [Next >>] button.



→ The DE installation starts and the [Status Check] screen appears. After the installation is complete, the [Finish] screen appears.

5 Click the [Done] button to return to the [Drive Enclosure] screen.

End of procedure

10.2.2 Turn on Locator Beacon/Turn off Locator Beacon

This function blinks or turns off the locator beacon of the CE, the CM, or the SVC to identify the component that requires maintenance.
The "IDENTIFY LED" blinks or is turned off at the following locations:

- The front cover of the CE
- The CM in the rear of the CE (for ETERNUS DX410 S2/DX440 S2 or ETERNUS DX8100 S2)
- The SVC in the rear of the CE (for ETERNUS DX8700 S2)

Note

When using the ETERNUS DX8700 S2, SVC#0 and SVC#1 blink or are turned off together.

Turning on the LED

The procedure to turn on an LED is as follows:

Procedure

1 Click [Turn on locator beacon] in [Action].

→ A confirmation screen appears.

Caution

If the LED is already turned on, [Turn on locator beacon] cannot be selected.

2 Click the [OK] button.



→ The locator beacon is turned on.

3 Click the [Done] button to return to the [Controller Enclosure] screen.

End of procedure

Turning off the LED

The procedure to turn off an LED is as follows:

Procedure

1 Click [Turn off locator beacon] in [Action].

→ A confirmation screen appears.

Caution

If the LED is already turned off, [Turn off locator beacon] cannot be selected.

2 Click the [OK] button.



→ The locator beacon is turned off.

3 Click the [Done] button to return to the [Controller Enclosure] screen.

End of procedure

10.2.3 Add Channel Adapter Port

This function enables a CA port to be added without stopping the ETERNUS DX Disk storage system.

Caution

- This function is available only for the ETERNUS DX80 S2 model that is using one port for each CM.
- CA ports for FC, iSCSI, FCoE, or SAS, host interfaces can be added.
- When the general status of the ETERNUS DX Disk storage system is not normal, a CA port cannot be added.

Note

The 1-port type CA is also displayed as a 2-port type. To determine whether the CA is 1-port type or 2-port-type, refer to the port number displayed in the [Internal Parts] tab in the "10.1.6 Channel Adapter Detail" (page 655). Note that 1-port type CAs are not available in some regions.

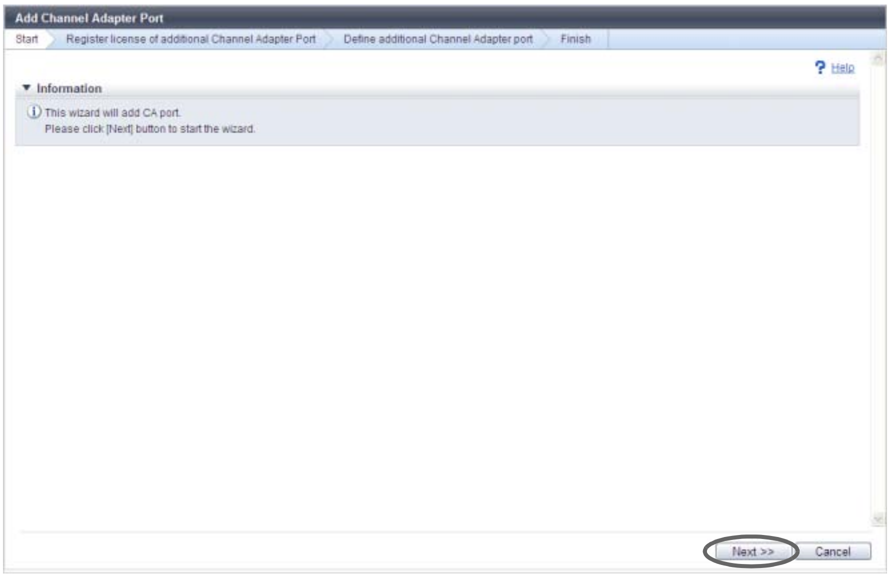
The procedure to add a CA port is as follows:

Procedure

1 Click [Add Channel Adapter Port] in [Action].

→ The [Start] screen appears.

2 Click the [Next >>] button.



The displayed screen may vary depending on whether the installation of license key is required or not.

- When the license key is not registered

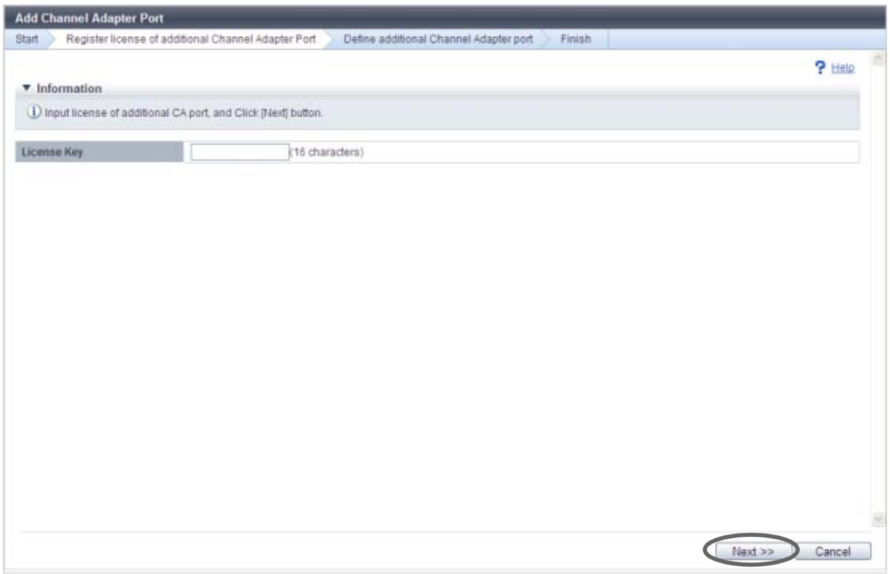
  → The [Register license of additional Channel Adapter Port] screen appears. Proceed to Step 3.

- When the license key is already registered

  → The [Define additional Channel Adapter port] screen appears. Proceed to Step 4.

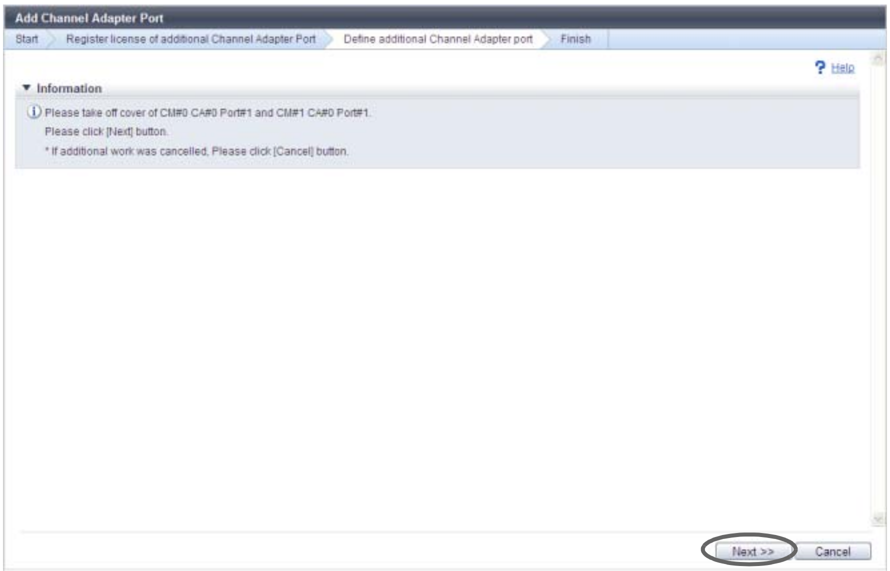
3 Input the license key, and click the [Next >>] button.

- License Key
  Input the license key.
  The following input conditions apply:
  - 16 characters
  - Capital letters and numeric characters



→ The [Register license of additional Channel Adapter Port] screen appears. The [Define additional Channel Adapter port] screen appears after the registration of the license key is complete.

4 Add the CA port according to the displayed procedure and click the [Next >>] button.



The operations and displayed screen vary depending on the host interface type that is used.

■ For FC, FCoE, or 10G iSCSI host interfaces

→ The installation of SFP starts and the [Check SFP Installation] screen appears. After the installation of the SFP is complete (when the CA includes an SFP), the installation of the CA port starts and the [Status Check] screen appears. After the installation of the CA port is complete, the [Finish] screen appears.

■ For 1G iSCSI or SAS host interfaces

→ The CA port installation starts and the [Status Check] screen appears. After the installation is complete, the [Finish] screen appears.

5 Click the [Done] button to return to the [All Channel Adapters] screen.

End of procedure

10.2.4 Assign Global Hot Spare

This function registers a drive as a Global Hot Spare.
A Global Hot Spare is a spare drive (hot spare) that is registered in the RAID group instead of the failed drive when a drive failure is occur. A Global Hot Spare, unlike a Dedicated Hot Spare, can be used by all of the RAID groups.
If a drive fails, data copy (rebuild) to a Global Hot Spare starts automatically.
When a failed drive is replaced, the data is copied back from the Global Hot Spare that is substituting for the failed drive, and the Global Hot Spare then returns to a spare drive.

Caution

- Drives that are currently used cannot be registered as Global Hot Spares.
- Make sure to register a Global Hot Spare with the same or a larger capacity than the data drives. If the Global Hot Spare capacity is smaller than the data drive, the drive does not work as the hot spare.
- When a mix of SAS disks, Nearline SAS disks, SSDs, and SEDs are installed together in the ETERNUS DX Disk storage system, Global Hot Spare of each type is required. Register the Global Hot Spare with the same capacity as the maximum capacity drive for each type.
- To use hot spares on a priority basis, make sure to register the Dedicated Hot Spare for a RAID group that contains important data. Refer to "10.2.6 Assign Dedicated Hot Spare" (page 704) for details.

Note

- If the Dedicated Hot Spare is registered for a RAID group to which a failed drive belongs, the Dedicated Hot Spare is used before the Global Hot Spare. If there is no unused Dedicated Hot Spare and the drive fails, the Global Hot Spare is used.
- Depending on the hot spare usage status, a drive with a different capacity and type from the failed drive may be used.
- Hot Spares can be registered any slots of the CEs (only for the ETERNUS DX80 S2/DX90 S2) and the DEs.

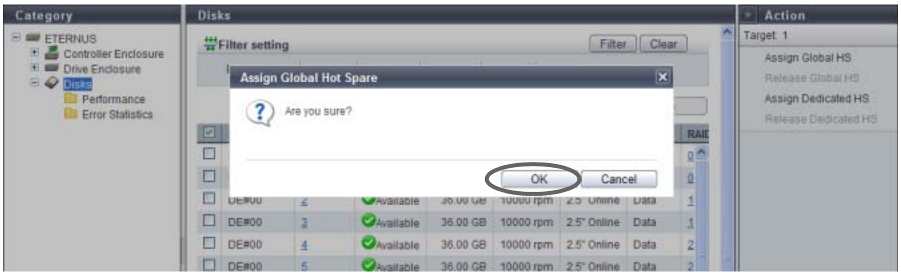
The procedure to register a Global Hot Spare is as follows:

Procedure

1 Select a drive that is to be used as a Global Hot Spare (multiple selections can be made) and click [Assign Global HS] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ Registration of the Global Hot Spare starts.

3 Click the [Done] button to return to the [Disks] screen.

End of procedure

10.2.5 Release Global Hot Spare

This function releases a drive from being a Global Hot Spare.
A drive that is released from being a Global Hot Spare can be used as a data drive or Dedicated Hot Spare for a different RAID group.

Caution

This function cannot be used when the drive is already used as a hot spare.

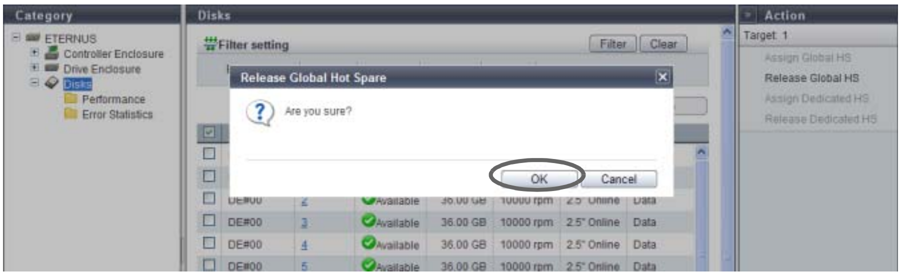
The procedure to release a Global Hot Spare is as follows:

Procedure

1 Select a drive (multiple selections can be made) that is to be released from being a Global Hot Spare and click [Release Global HS] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ Releasing of the Global Hot Spare starts.

3 Click the [Done] button to return to the [Disks] screen.

End of procedure

10.2.6 Assign Dedicated Hot Spare

This function registers a drive as a Dedicated Hot Spare for a RAID group.
A Dedicated Hot Spare is a spare drive (hot spare) that is registered in the RAID group instead of the failed drive when a drive failure is occur. A Dedicated Hot Spare, unlike a Global Hot Spare, is used only for the specific RAID group.
If a drive fails, data copy (rebuild) to a Dedicated Hot Spare starts automatically.
When a failed drive is replaced, the data is copied back from the Dedicated Hot Spare that is substituting for the failed drive, and the Dedicated Hot Spare then returns to a spare drive.

Caution

- Drives that are currently used cannot be registered as Dedicated Hot Spares.
- Make sure to register a Dedicated Hot Spare with the same or a larger capacity than the data drives. If the Dedicated Hot Spare capacity is smaller than the data drive, the drive does not work as the hot spare.
- When a mix of SAS disks, Nearline SAS disks, SSDs, and SEDs are installed together in the ETERNUS DX Disk storage system, Dedicated Hot Spare of each type is required. Register the Dedicated Hot Spare with the same capacity as the maximum capacity drive for each type.
- Only one RAID group can be registered for each Dedicated Hot Spare. A Dedicated Hot Spare cannot be registered to multiple RAID groups.
- Dedicated Hot Spares cannot be registered for a RAID group that belongs to a TPP, an FTRP, or an REC Disk Buffer.

Note

- When the failed drive and the Dedicated Hot Spare are switched, a Dedicated Hot Spare with the same capacity as the failed drive is used on a priority basis. If there is no Dedicated Hot Spare with the same capacity, a Dedicated Hot Spare with a larger capacity than the failed drive is used.
- If the Dedicated Hot Spare is registered for a RAID group to which a failed drive belongs, the Dedicated Hot Spare is used before the Global Hot Spare. If there is no unused Dedicated Hot Spare and the drive fails, the Global Hot Spare is used.
- Hot Spares can be registered any slots of the CEs (only for the ETERNUS DX80 S2/DX90 S2) and the DEs.

The procedure to register a Dedicated Hot Spare is as follows:

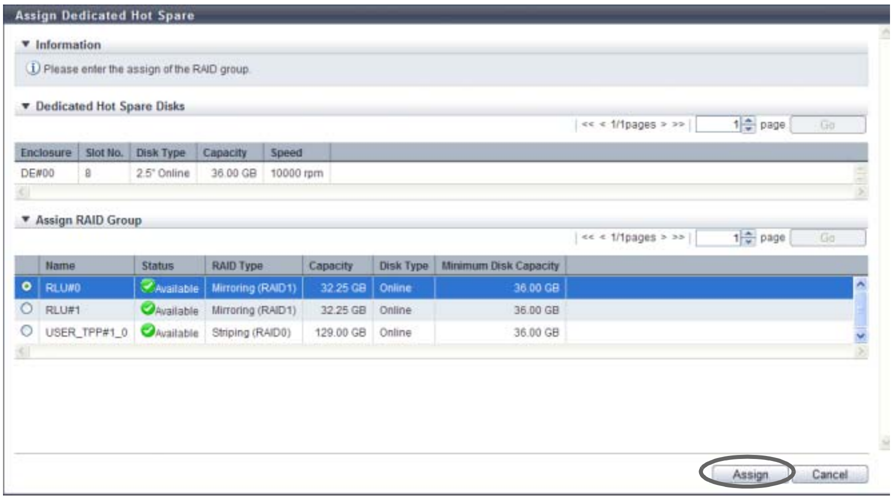
Procedure

1 Select a drive (multiple selections can be made) that is to be used as a Dedicated Hot Spare and click [Assign Dedicated HS] in [Action].

Note

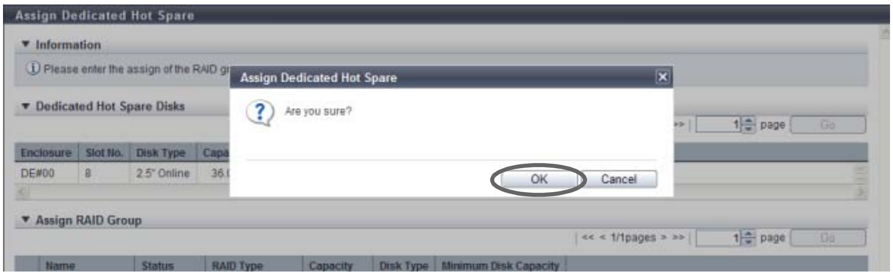
Select the same type of drives that configure the target RAID group. If multiple types of drives are selected, the [Assign Dedicated HS] is not available.

2 Select which RAID group to use the selected drive as a Dedicated Hot Spare for and click the [Assign] button.



→ A confirmation screen appears.

3 Click the [OK] button.



→ Registration of the Dedicated Hot Spare starts.

4 Click the [Done] button to return to the [Disks] screen.

End of procedure

10.2.7 Release Dedicated Hot Spare

This function releases a drive from being a Dedicated Hot Spare.
A drive that is released from being a Dedicated Hot Spare can be used as a data drive, Global Hot Spare, or Dedicated Hot Spare for a different RAID group.

Caution

This function cannot be used when the drive is already used as a hot spare.

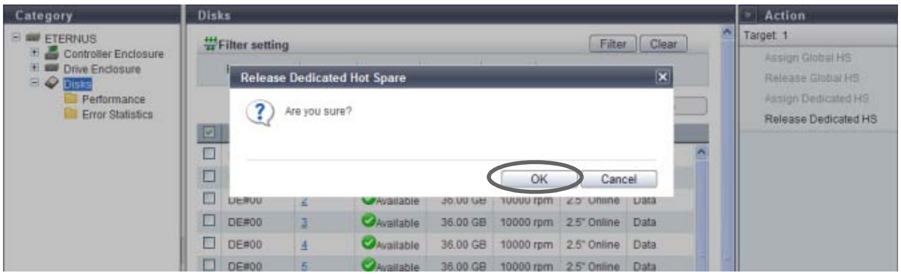
The procedure to release a Dedicated Hot Spare is as follows:

Procedure

1 Select a drive (multiple selections can be made) that is to be released from being a Dedicated Hot Spare and click [Release Dedicated HS] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ Releasing of the Dedicated Hot Spare starts.

3 Click the [Done] button to return to the [Disks] screen.

End of procedure

10.2.8 Export Performance Information

This function exports the following performance information in a single operation and saves it as a text file.

- Performance (Host I/O)
- Performance (Advanced Copy)
- Performance (CA)
- Performance (CM)
- Performance (Drive)

Refer to "5.2.20 Export Performance Information" (page 155) for details.

10.2.9 Clear Disk Error Statistics (All Disks)

This function deletes the error information from all of the drives.

Note

This function can be performed without selecting the drive to delete error information or without the error information that is to be deleted.

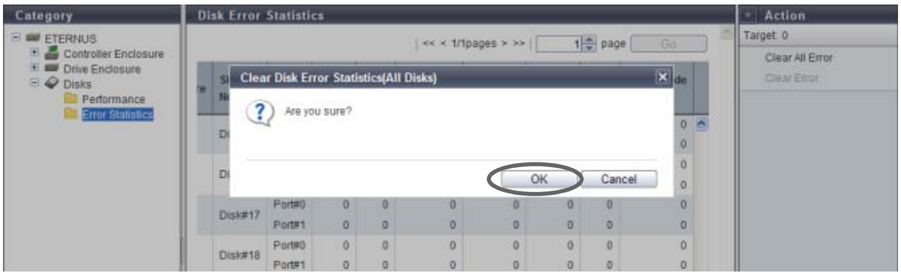
The procedure to delete error information from all the drives is as follows:

Procedure

1 Click [Clear All Error] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ Deletion of the error information from all the drives starts.

3 Click the [Done] button to return to the [Disk Error Statistics] screen.

End of procedure

10.2.10 Clear Disk Error Statistics (Selected Disks)

This function deletes the error information from the selected drive.

Note

This function can only be performed when an error occurs in a drive.

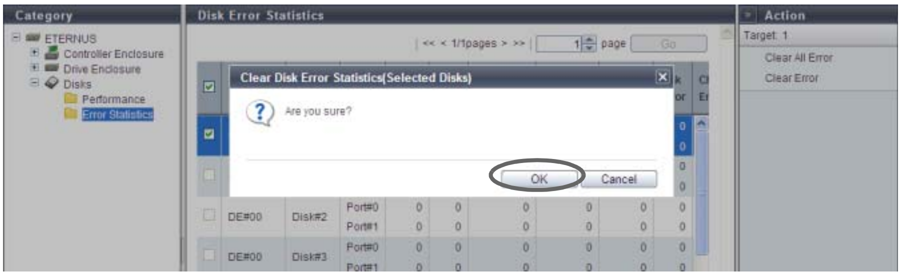
The procedure to delete error information from the selected drive is as follows:

Procedure

1 Select the drive to delete error information from (multiple selections can be made) and click [Clear Error] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ Deletion of the error information from the selected drive starts.

3 Click the [Done] button to return to the [Disk Error Statistics] screen.

End of procedure

Chapter 11
System Management

This chapter describes system management.

11.1 System Status

System status displays the status information of volumes.
System status screens can be displayed by clicking the following categories:

System status screen	Category
System (Basic Information)	Storage system name
Network	Network
Remote Support (REMCS) for Regions other than EMEA	Remote Support
Remote Support (AIS Connect) for Regions other than Japan	
Root Certificate	Root Certificate
Key Management	Key Management
Key Group	Key Group
Define Role	User Settings
ECO Mode	ECO Mode
Event/Dump	Event/Dump
Audit Log	Audit Log
Storage Migration	Storage Migration
Utility	Utility
System Settings	System Settings

Detailed information of the system settings can be displayed from the following screen:

- ECO Mode Schedule Detail
- Path Group Detail Information

11.1.1 System (Basic Information)

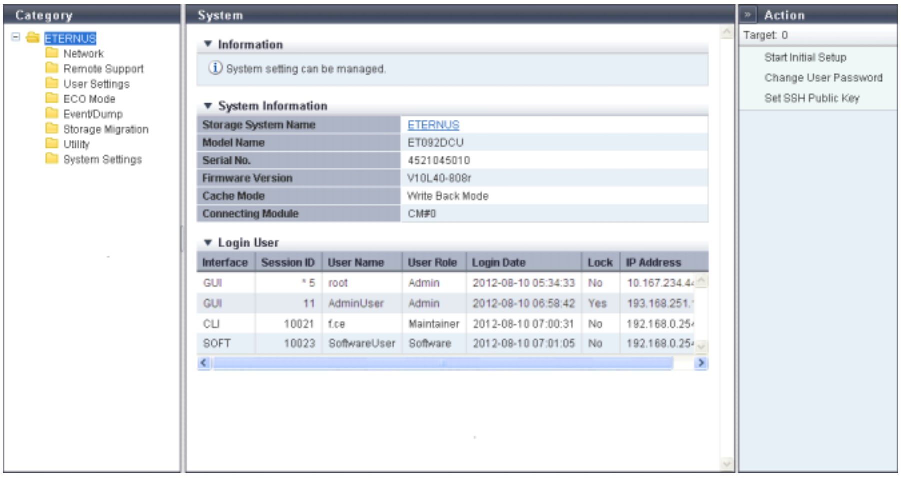
This function displays the system information and a list of users who are currently logged in.

Caution

- The user list is displayed only when a user account with the "User Management" policy is used to log in.
- A list of following user is displayed:
  - Users who are logged in to the Master CM from GUI
  - Users who are logged in to the Slave CM from GUI
  - Users who are logged in to the Master CM from CLI or other software
    Note that users who are logged in to the Slave CM from CLI or other software are not displayed.

Note

- The storage system name is displayed at the top of the [System] navigation category.
  The "Storage System Name" is specified using the procedure in "11.2.13.1 Modify Storage System Name" (page 927).
- Click the "Storage System Name" in the category to display a list of the users who logged in to the ETERNUS DX Disk storage system in the "Login User" field. Click the "Storage System Name" again or click the [ ] icon to display the latest screen.



The following items are displayed in the Main area:

System Information

- Storage System Name
  The name for the ETERNUS DX Disk storage system is displayed.
  By clicking this item, the [Storage] screen in the [Component] navigation is displayed.
- Model Name
  The model name of the ETERNUS DX Disk storage system is displayed.
- Serial No.
  The serial number of the ETERNUS DX Disk storage system is displayed.

- Firmware Version
  The current controller firmware version is displayed.
  - VxxLyy-zzzz (Vxx: Version, Lyy: Level, zzzz: Release number)

- Cache Mode
  The current status and the factor of the cache are displayed. The normal status is "Write Back Mode".
  - Write Back Mode
    When a Write request is issued from the host, "Write Complete" is displayed after writing to the cache area is complete.
  - Write Through Mode
    When a Write request is issued from the host, "Write Complete" is displayed after writing to the cache area and the drives is complete.
    In the Write Through Mode, "Write Through (factors)" is displayed. When there are multiple factors, all the factors are displayed.
    The factors of the Write Through Mode are described below:
    - Write Through (Pinned Data)
      A large amount of pinned data is detected in the ETERNUS DX Disk storage system.
    - Write Through (Battery)
      The battery charge level is low.
    - Write Through (Maintenance)
      The following maintenance operation is currently being used:
      - Switch Controller Firmware
      - Change Controlling CM
      - Add Controller Module
    - Write Through (1CM)
      The ETERNUS DX Disk storage system is operated with 1CM. (*1)

      *1: This mode is displayed when "1CM Write Through" is enabled by using the procedure in "11.2.13.4 Setup Subsystem Parameters" (page 935) function and the ETERNUS DX Disk storage system is operated with 1CM (only 1CM can be used due to an error such as a CM failure). The "1CM Write Through" setting for the "Setup Subsystem Parameters" function is displayed and can be changed when logged in using a user account with the "Maintenance Operation" policy. The normal status is disabled.

- Connecting Module
  The CM to which the GUI is connected is displayed.

Login User

- Interface
  The interface type for users who are logged in is displayed.
  - GUI
    Users logged in via GUI or users logged in via GUI from the AIS Connect server (*1)
  - CLI
    Users logged in via CLI or users logged in via CLI from the AIS Connect server (*1)
  - SOFT
    Users logged in from software.
    "SOFT" is displayed in the following conditions:
    - When users log in from software with the default "Software" role via CLI
    - When users log in using SMI-S via software
    - When users log in from software using Dynamic LUN Mirroring (DLM) via CLI

*1: AIS Connect servers are supplied for regions other than Japan.

- Session ID
  An identification number between 0 - 65535 for users who are logged in is displayed.
  A session ID is obtained for each login and released with each logout. Because the session ID is obtained discretely, the same session ID is not used even if the same user logs in again. GUI uses session IDs between 1 - 999 and CLI (including SOFT) uses session IDs from 1001 onwards. An "*" (asterisk) is added on top of the current user's (your) session ID.
  - 0 - 65535
  - For the current user's (your) session: * xxxxx (xxxxx: 0 - 65535)
- User Name
  The user name (user ID) for a user who is logged in is displayed. When the interface is "SOFT" (SMI-S or DLM), the field is blank.
- User Role
  The user role for a user who is logged in is displayed.
  - Monitor
  - Admin
  - StorageAdmin
  - AccountAdmin
  - SecurityAdmin
  - Maintainer
  - Software
  - Custom role
- Login Date
  The login date and time are displayed.
  - YYYY-MM-DD hh:mm:ss (YYYY: Year (2001 - 2037), MM: Month (01 - 12), DD: Day (01 - 31), hh: Hour (00 - 23), mm: Minute (00 - 59), ss: Second (00 - 59))
- Lock
  If a logged in user is updating data that is managed by the ETERNUS DX Disk storage system, "Yes" is displayed. If a user is not updating data, "No" is displayed. When "Yes" is displayed for a user, other users with "No" displayed cannot update data.
  Note that multiple users cannot update data that is managed by the ETERNUS DX Disk storage system at the same time. The storage system is exclusively used by a user who is updating the data. The exclusion is released when the updating is complete.
- IP Address
  The IP address for a user who is logged in is displayed. When a user logged in from the AIS Connect server, "AIS Connect Server" is displayed (for regions other than Japan). When the interface is "SOFT" (SMI-S), the IP address is displayed only when logged in the ETERNUS DX Disk storage system via an external software. When the interface is "SOFT" (DLM) or when the interface is "SOFT" (SMI-S) and the external software is not used, the field is blank.
  - For IPv4 address
    - xxx.xxx.xxx.xxx
      xxx: 0 - 255 (decimal)
  - For IPv6 address
    - xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
      xxxx: 0 - ffff (hexadecimal, "a" - "f" are lowercase letters)
      Refer to "IPv6 Address Notation" (page 378) for details.

11.1.2 Network

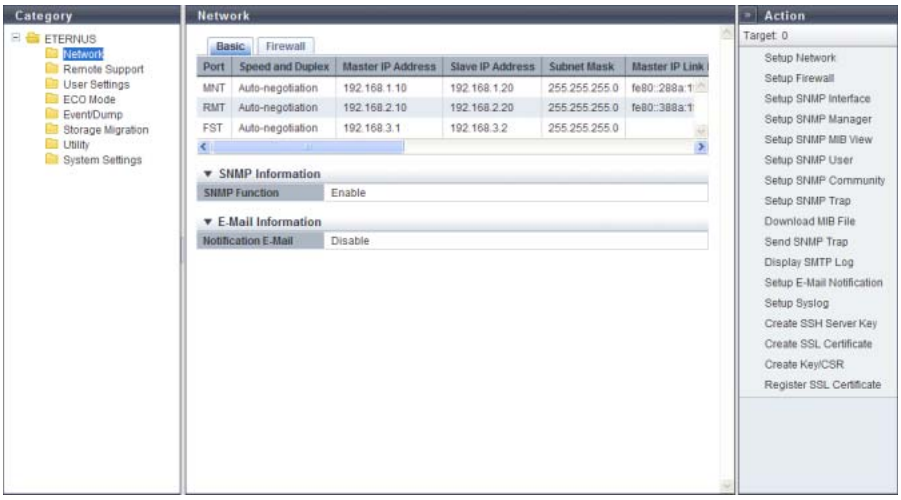
This function displays the network environment of each port in the ETERNUS DX Disk storage system.

Caution

Click the [ ] icon to display the latest screen. Note that after changing the firewall setting and returning to this screen, it takes approximately 10 seconds to update the display contents. Wait at least 10 seconds and click the [ ] icon or click [Network] in the category to display the [Network] screen again.

Basic

The network environment of each port, the SNMP information registered in the ETERNUS DX Disk storage system, and the E-mail information are displayed.



The following items are displayed in the Main area:

- Port
  The port type is displayed.
  - For ETERNUS DX80 S2/DX90 S2: MNT or RMT
  - ETERNUS DX410 S2/DX440 S2: MNT, RMT, or FST
  - For ETERNUS DX8100 S2/DX8700 S2: MNT, RMT, or FST
- Speed and Duplex
  The transfer speed and the communication method are displayed.
  - Auto-negotiation
  - 1Gbit/s
  - 100Mbit/s Half
  - 100Mbit/s Full
  - 10Mbit/s Half
  - 10Mbit/s Full

- Master IP Address
  The IP address of the Master CM, which has been specified to the port, is displayed.
  If not specified, the field is blank. This item is used for IPv4.
- Slave IP Address
  The IP address of the Slave CM, which has been specified to the port, is displayed.
  If there is only one CM, the "Slave CM IP Address" is not displayed.
  If not specified, the field is blank. This item is used for IPv4.
- Subnet Mask
  The Subnet Mask, which has been specified to the port, is displayed.
  If not specified, the field is blank. This item is used for IPv4.
- Master IP Link Local Address
  The link local address of the Master CM, which has been specified to the port, is displayed.
  If not specified or when "Port" is "FST", the field is blank. This item is used for IPv6.
- Master Connect IP Address
  The connect IP address of the Master CM, which has been specified to the port, is displayed.
  "Master Connect IP Address" corresponds to "Master IP Address" for IPv4.
  If not specified or when "Port" is "FST", the field is blank. This item is used for IPv6.
- Slave IP Link Local Address
  The link local address of the Slave CM, which has been specified to the port, is displayed.
  This item is not displayed for the 1CM model.
  If not specified or when "Port" is "FST", the field is blank. This item is used for IPv6.
- Slave Connect IP Address
  The connect IP address of the Slave CM, which has been specified to the port, is displayed.
  "Slave Connect IP Address" corresponds to "Slave IP Address" for IPv4.
  This item is not displayed for the 1CM model.
  If not specified or when "Port" is "FST", the field is blank. This item is used for IPv6.
- Length of Subnet Prefix
  The prefix length for the connect IP address is displayed (unit: bit).
  "Length of Subnet Prefix" corresponds to "Subnet Mask" for IPv4.
  If not specified or when "Port" is "FST", the field is blank. This item is used for IPv6.

SNMP Information

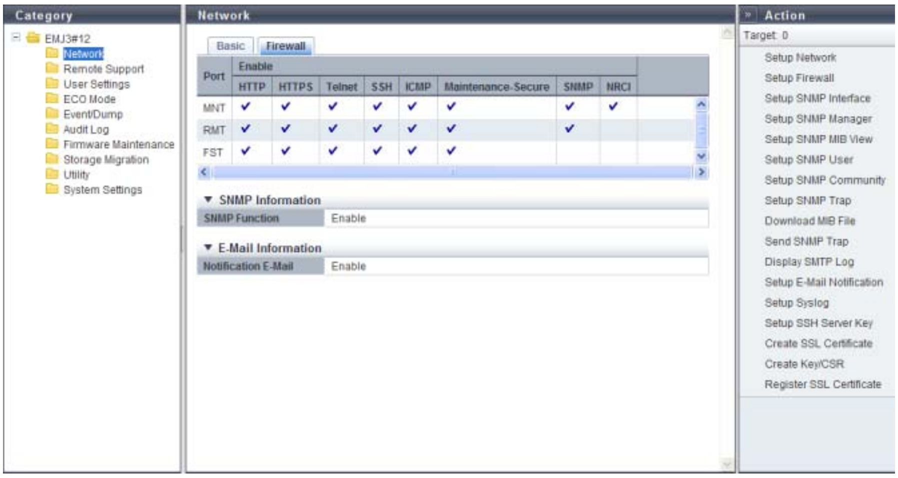
- SNMP Function
  Whether the SNMP function is enabled or disabled is displayed.

E-Mail Information

- Notification E-Mail
  Whether the E-mail notification is enabled or disabled is displayed.

Firewall

The Firewall setting status for each service and the SNMP information and the E-Mail information of the ETERNUS DX Disk storage system are displayed.



The following items are displayed in the Main area:

- Port
  The port type is displayed.
  - For ETERNUS DX80 S2/DX90 S2: MNT or RMT
  - For ETERNUS DX410 S2/DX440 S2: MNT, RMT, or FST
  - For ETERNUS DX8100 S2/DX8700 S2: MNT, RMT, or FST
- HTTP
  Whether the HTTP connection is enabled or disabled is displayed. (*1)
- HTTPS
  Whether the HTTPS connection is enabled or disabled is displayed. (*1)
- Telnet
  Whether the Telnet connection is enabled or disabled is displayed. (*1)
- SSH
  Whether the SSH connection is enabled or disabled is displayed. (*1)
- ICMP
  Whether the ICMP connection is enabled or disabled is displayed. (*1)
- Maintenance Secure
  Whether the Maintenance Secure connection is enabled or disabled is displayed. (*1)
- SNMP
  Whether the SNMP connection is enabled or disabled is displayed. (*1)
- RCIL
  Whether the RCIL connection is enabled or disabled is displayed. (*1)
  Whether RCIL is enabled or disabled is only displayed for the MNT port. This item is always left blank for RMT and FST ports.

*1: When the SNMP connection is enabled, "✓" is displayed. If the SNMP connection is disabled, the field is blank.

SNMP Information

- SNMP Function
  Whether the SNMP function is enabled or disabled is displayed.

E-Mail Information

- Notification E-Mail
  Whether the E-mail notification is enabled or disabled is displayed.

11.1.3 Remote Support (REMCS) for Regions other than EMEA

This function displays the Remote Support function settings and the operation status in the ETERNUS DX Disk storage system.

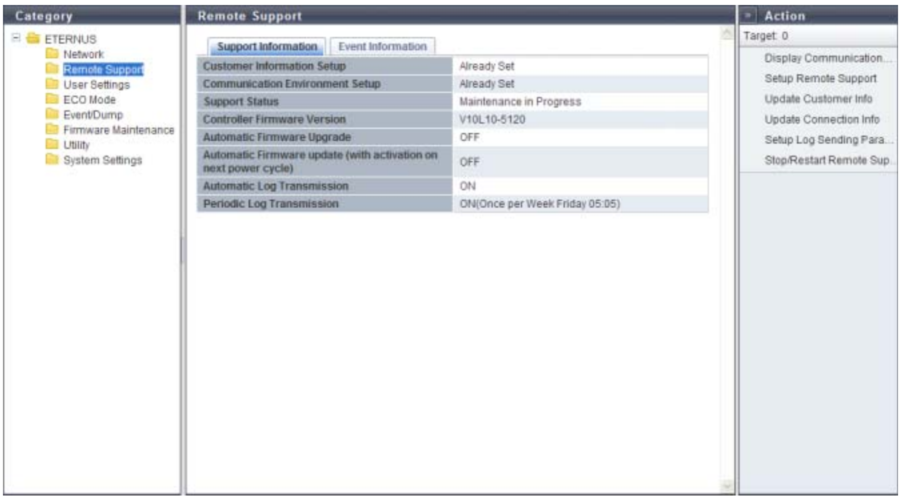
Caution

This caution is applied for regions other than Japan.
REMCS and AIS Connect cannot be used at the same time. AIS Connect function can only be used when REMCS is not specified or is stopped. When REMCS is used, suspend the REMCS function, and then enable the AIS Connect function. Refer to "11.2.4.6 Stop/Restart Remote Support" (page 818) for details.
REMCS can be specified or restarted when the AIS Connect function is disabled. Refer to "11.2.5.1 Setup AIS Connect Environment" (page 821) for details.

Note

Click the [ ] icon to update to the latest screen.

Support Information



The following items are displayed in the Main area:

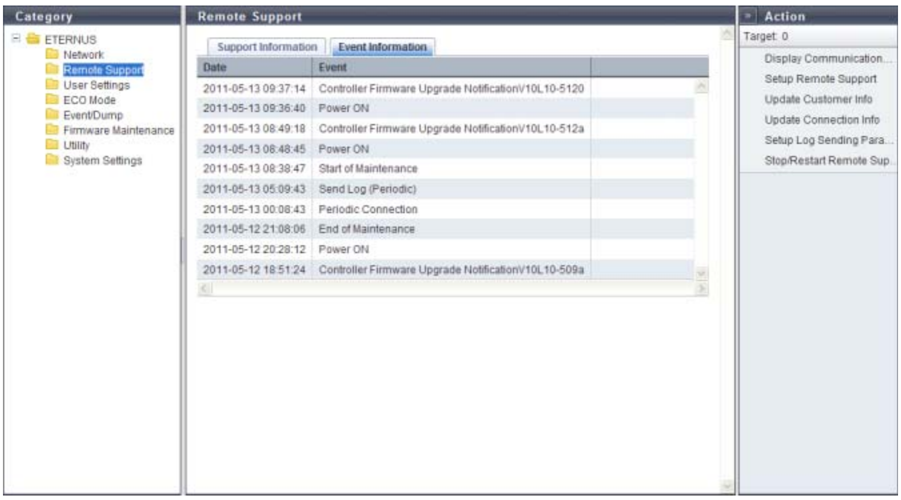
- Customer Information Setup
  Whether or not the customer information has been specified at the REMCS center is displayed.
- Communication Environment Setup
  Whether or not the communication environment information has been specified at the REMCS center is displayed.
- Support Status
  The Remote Support status is displayed.
  - "-" (hyphen)
    The Remote Support is not operating.
  - Operating
    The Remote Support is operating.
  - Maintenance in Progress
    The ETERNUS DX Disk storage system is under maintenance. When the operation to complete maintenance is performed, the status returns to "Operating".
  - Stopped
    The Remote Support has temporarily been stopped. Use the procedure in "11.2.4.6 Stop/Restart Remote Support" (page 818) to restart the Remote Support and return to the "Operating" state.

  If the support status is "Operating" or "Maintenance in Progress", one of the messages below appears in parentheses based on the Remote Support operating status.
  - Controller Firmware Download in Progress
  - Termination of Controller Firmware Download in Progress
  - Controller Firmware Upgrade in Progress
  - Log Collection in Progress
- Controller Firmware Version
  The current controller firmware version is displayed.
  - VxxLyy-zzzz (Vxx: Version, Lyy: Level, zzzz: Release number)
- Automatic Firmware Upgrade
  Whether the automatic firmware upgrade is enabled or disabled is displayed.
  - "-" (hyphen)
    The Remote Support is not operating.
  - ON (download schedule)
    The automatic firmware upgrade is enabled. Receive controller firmware according to the download schedule.
  - OFF
    The automatic firmware upgrade is disabled.
- Automatic Firmware upgrade (with activation on next power cycle)
  Whether or not to execute the controller firmware application, after controller firmware download has been completed, is displayed.
  - "-" (hyphen)
    The Remote Support is not operating.
  - ON
    Execute the controller firmware application after controller firmware download is complete. The downloaded controller firmware will be changed to the controller firmware which will be enabled at the next startup.
  - OFF
    Do not execute the controller firmware application after controller firmware download is complete.

- Automatic Log Transmission
  Whether the automatic log transmission is enabled or disabled is displayed.
  - "-" (hyphen)
    The Remote Support is not operating.
  - ON
    The automatic log transmission is enabled. The internal log of the ETERNUS DX Disk storage system is automatically sent to the REMCS center when an error occurs.
  - OFF
    The automatic log transmission is disabled.
- Periodic Log Transmission
  Whether the periodical log transmission is enabled or disabled is displayed.
  - "-" (hyphen)
    The Remote Support is not operating.
  - ON (transmission schedule)
    The periodical log transmission is enabled. The internal log of the ETERNUS DX Disk storage system is automatically sent to the REMCS center according to the transmission schedule.
  - OFF
    The periodical log transmission is disabled.

Event Information

In this screen, ten latest pieces of event information are displayed.



The following items are displayed in the Main area:

- Date
  The date and time when the Remote Support events occurred, are displayed.
  - YYYY-MM-DD hh:mm:ss (YYYY: Year (AD), MM: Month (01 - 12), DD: Day (01 - 31), hh: Hour (00 - 23), mm: Minute (00 - 59), ss: Second (00 - 59))
- Event
  The Remote Support event is displayed.

11.1.4 Remote Support (AIS Connect) for Regions other than Japan

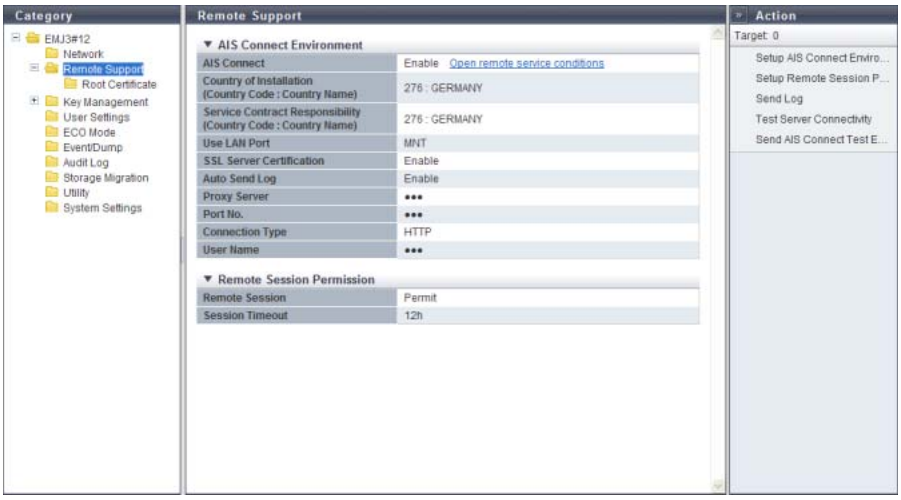
This function displays the setting information for AIS Connect.
The AIS Connect function monitors or controls remotely the ETERNUS DX80 S2/DX90 S2, the ETERNUS DX410 S2/DX440 S2, or the ETERNUS DX8100 S2/DX8700 S2 from a remote server (AIS Connect server).

Caution

This caution is applied for regions other than EMEA.
REMCS and AIS Connect cannot be used at the same time. AIS Connect function can only be used when REMCS is not specified or is stopped. When REMCS is used, suspend the REMCS function, and then enable the AIS Connect function. Refer to "11.2.4.6 Stop/Restart Remote Support" (page 818) for details.
REMCS can be specified or restarted when the AIS Connect function is disabled. Refer to "11.2.5.1 Setup AIS Connect Environment" (page 821) for details.

Note

- Click the [ ] icon to update to the latest screen.
- Use CLI to set "Service Contract Responsibility (Country Code : Country Name)". Note that the "Maintenance Operation" policy is required to set this item.



The following items are displayed in the Main area:

- AIS Connect Environment

- AIS Connect
  Whether the AIS Connect function is enabled or disabled is displayed.
  When "Country of Installation (Country Code : Country Name)" has been set, the [Open remote service conditions] link is displayed. Click this item to display the consent form regarding the handling of personal information.

- Country of Installation (Country Code : Country Name)
  The shipment destination (storage system location) is displayed in "Country Code : Country Name" format.
  If not specified, "Not Selected" is displayed.

- Service Contract Responsibility (Country Code : Country Name)
  The country in which the support office for the ETERNUS DX Disk storage system is located is displayed in "Country Code : Country Name" format.

  Caution

  This item is not displayed when "Service Contract Responsibility (Country Code : Country Name)" is not specified from CLI.

- Use LAN Port
  The LAN port that is used for communication with the AIS Connect server is displayed.
  - MNT
  - RMT
- SSL Server Certification
  When SSL server certification is used for communication with the AIS Connect server, "Enable" is displayed. When the SSL server certification is not used, "Disable" is displayed.
- Auto Send Log
  Whether the automatic log transmission is enabled or disabled is displayed.
  When "Auto Send Log" is enabled, the ETERNUS DX Disk storage system automatically sends logs to the AIS Connect server when a fail event (error level or warning level) occurs.
- Proxy Server
  The IPv4 address or the Fully Qualified Domain Name (FQDN) of the proxy server is displayed. If the proxy server is not specified, the field is blank.
  - IPv4 address
    xxx.xxx.xxx.xxx
    xxx: 0 - 255 (decimal)
  - FQDN
    Up to 63 alphanumeric characters and symbols
- Port No.
  The port number for the proxy server is displayed. If the proxy server is not specified, the field is blank.
- Connection Type
  The communication method for the proxy server is displayed. If the proxy server is not specified, the field is blank.
  - HTTP
  - SOCKS
- User Name
  The user name for proxy server authentication is displayed. If the proxy server is not specified, the field is blank.

Remote Session Permission

- Remote Session
  Whether to permit or forbid a remote session from the AIS Connect server is displayed.
- Session Timeout
  The timeout value for a remote session connection is displayed. If the timeout limit is not specified, "Unlimited" is displayed.
  If the time exceeds the specified value without a remote session connection, remote session permission is disabled and the setting status changes to "Forbid".

11.1.4.1 Root Certificate

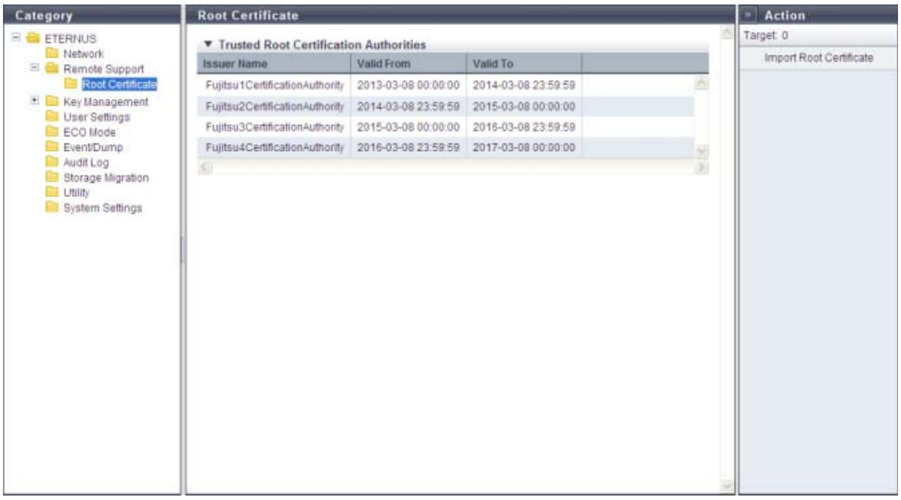
This function displays the root certificate that is used for SSL communication with the AIS Connect server.

Caution

If multiple certificates are included in the root certificate file, up to 6 issuer names and their validity periods are displayed.

Note

- The root certificate that is registered in the ETERNUS DX Disk storage system is displayed by default. When the root certificate is updated, only the latest certificate is displayed. For details on how to update the root certificate, refer to "11.2.5.6 Import Root Certificate" (page 830).
- The root certificate is only used for authentication with the AIS Connect server.



The following items are displayed in the Main area:

- Trusted Root Certification Authorities

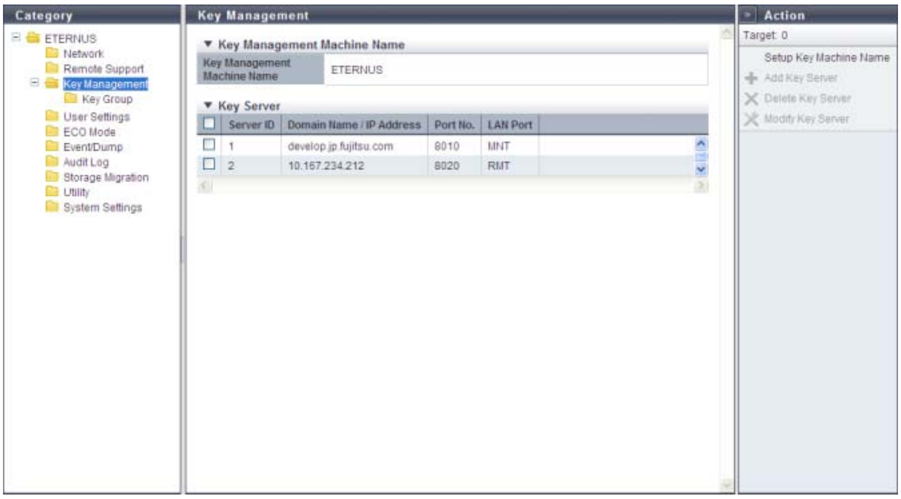
  - Issuer Name
    The issuer name for the root certificate is displayed.

  - Valid From
    The start date and time of the root certificate validity period is displayed.
    - YYYY-MM-DD hh:mm:ss (YYYY: Year (AD), MM: Month (01 - 12), DD: Day (01 - 31), hh: Hour (00 - 23), mm: Minute (00 - 59), ss: Second (00 - 59))

  - Valid To
    The end date and time of the root certificate validity period is displayed.
    - YYYY-MM-DD hh:mm:ss (YYYY: Year (AD), MM: Month (01 - 12), DD: Day (01 - 31), hh: Hour (00 - 23), mm: Minute (00 - 59), ss: Second (00 - 59))

11.1.5 Key Management

This function displays the setting parameters for the key server.
In this section, the SED authentication key is referred to as "key".



The following items are displayed in the Main area:

Key Management Machine Name

- Key Management Machine Name
  The name of the device that is connected to the key server is displayed. If the key management device name is not specified, the field is blank.

Key Server

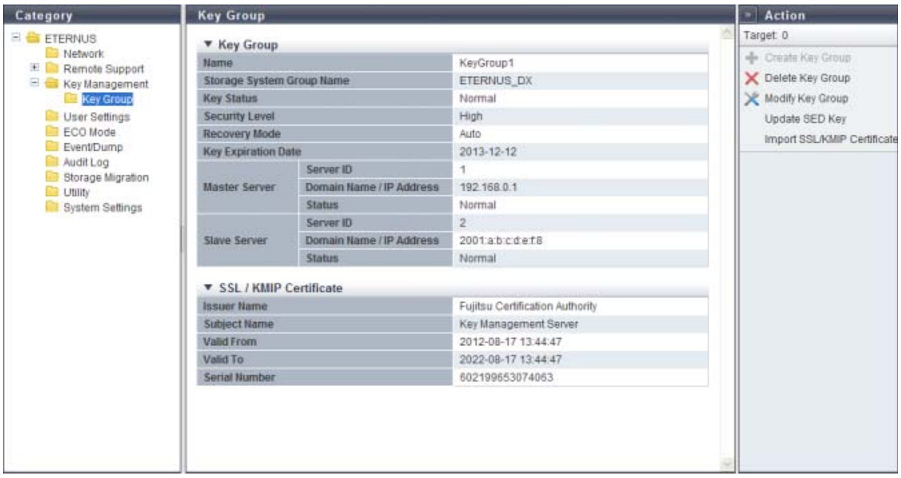
- Server ID
  The key server ID is displayed.
- Domain Name / IP Address
  The domain name (Fully Qualified Domain Name: FQDN) or the IP address for the key server is displayed. Note that the IPv6 address is displayed as an abbreviation. Refer to "IPv6 Address Notation" (page 378) for details.
- Port No.
  The port number that is used to communicate with the key server is displayed.
- LAN Port
  The LAN port that is used to communicate with the key server is displayed.
  - MNT
  - RMT

11.1.5.1 Key Group

This function displays the key information that is used for a key group and the SSL/KMIP certificate information.
The key group combines all of the RAID groups that use the same key.

Note

The RAID groups that are registered in the key group can be checked by using the [SED Key Group] screen.
Refer to "6.1.4 SED Key Group" (page 167) for details.



The following items are displayed in the Main area:

Key Group

- Name
  The key group name is displayed. If no key groups are created, the field is blank.
  The key group name corresponds to "Serial Number", which is managed in the key server.
- Storage System Group Name
  The storage system group name is displayed. If no key groups are created, the field is blank.
  The storage system group combines the key management device (Key Management Machine) name that is managed by the user with the key groups. The storage system group name corresponds to "Device Group Name", which is managed in the key server. Note that "ETERNUS_DX" is specified as the default device group name when an ETERNUS DX Disk storage system is shipped with "ETERNUS SF KM" (key management software).
- Key Status
  The key status is displayed. If no key groups are created, the field is blank.
  Refer to "B.6 Key Status" (page 979) for details.
- Security Level
  The security level for the key group is displayed. If no key groups are created, the field is blank.
  "Security Level" indicates the handling level when application of the SED key to the target RAID group fails. If the key for the relevant RAID group cannot be obtained from the key server due to a communication error and the SEDs that configure the RAID group are changed to hot spares or changed to new SEDs due to failure or maintenance, the ETERNUS DX Disk storage system performs operations according to the selected security level.

- High
  Rebuilding to hot spares for which the key cannot be changed after SED failure is not performed. The RAID group loses its redundancy (" Exposed" or " Partially Exposed" (for High Reliability (RAID6))).
  When SED maintenance is being performed, replacing a SED with a new SED for which the key cannot be changed does not complete successfully. If this action is performed, the status of the new SED changes to " Not Exist".
  When communication between the key server and the ETERNUS DX Disk storage system returns to normal and the key can be obtained, the SED status changes to normal. Rebuilding to the SED for which the status changed to normal is performed after the key is changed. Note that "Modifying" may be displayed for the key status for few minutes even though the SED key has already changed. After changing the key, maintenance of the SEDs is complete.
- Low
  Rebuilding or maintenance is performed by using the common key if changing of the key in the key server fails due to a network error.

  Even if the security level is changed from "High" to "Low", the rebuilding process does not start immediately after the level is changed. Rebuilding processes start after the ETERNUS DX Disk storage system recognizes that changing of the security level and the key is complete.

- Recovery Mode
  The recovery mode for the key group is displayed. If no key groups are created, the field is blank.
  The recovery mode is a method to recover locked (*1) RAID groups or SEDs after communication with the key server is resolved. For RAID groups in locked status, " SED Locked" is displayed. For SEDs in locked status, " Not Exist" is displayed.

  *1: A blocked status that occurs when the key of the RAID groups cannot be obtained.

  - Auto
    This mode recovers locked RAID groups or SEDs when the communication error with the key server is resolved.
  - Manual
    Use the [Recovery SED] function of GUI to recover the locked RAID groups or SEDs when the communication error with the key server is resolved.

- Key Expiration Date
  The key expiration date is displayed. If no key groups are created, the field is blank.
  When the key has expired, a new key is obtained from the key server and automatically applied in place of the expired key.
  Note that the display contents for this item changes as follows:
  - When the key status is "Modifying", the expiration date before the key was replaced is displayed.
  - When the key status is "Unregistered Server Certificate", "No SSL Certificate", "Network Error", "Not Acquired", or "Key Server Error", a "-" (hyphen) is displayed.
    - YYYY-MM-DD (YYYY: Year (AD), MM: Month (01 - 12), DD: Day (01 - 31))

- Master Server
  - Server ID
    The key server ID for the master server is displayed. If no key group is created or if no master server is specified, the field is blank.
  - Domain Name / IP Address
    The domain name (FQDN) or the IP address of the master server is displayed. If no key groups are created or if no master server is specified, the field is blank.
    Note that the IPv6 address is displayed as an abbreviation. Refer to "IPv6 Address Notation" (page 378) for details.

- Status
  The master server status is displayed. If no key group is created or if no master server is specified, the field is blank.
  Refer to "B.7 Key Server Status" (page 980) for details.

- Slave Server
  - Server ID
    The key server ID of the slave server is displayed. If no key group is created or if no slave server is specified, the field is blank.
  - Domain Name / IP Address
    The domain name (FQDN) or the IP address of the slave server is displayed. If no key group is created or if no slave server is specified, the field is blank.
    Note that the IPv6 address is displayed as an abbreviation. Refer to "IPv6 Address Notation" (page 378) for details.
  - Status
    The slave server status is displayed. If no key group is created or if no slave server is specified, the field is blank.
    Refer to "B.7 Key Server Status" (page 980) for details.

SSL / KMIP Certificate

- Issuer Name
  The certificate authority name that issues the SSL / KMIP certificate is displayed. If the certificate is not imported, the field is blank.

- Subject Name
  The name of the destination to which the SSL / KMIP certificate is issued is displayed. If the certificate is not imported, the field is blank.

- Valid From
  The start date and time of the SSL / KMIP certificate validity period is displayed. If the certificate is not imported, the field is blank.
  - YYYY-MM-DD hh:mm:ss (YYYY: Year (AD), MM: Month (01 - 12), DD: Day (01 - 31), hh: Hour (00 - 23), mm: Minute (00 - 59), ss: Second (00 - 59))

- Valid To
  The end date and time of the SSL / KMIP certificate validity period is displayed. If the certificate is not imported, the field is blank.
  - YYYY-MM-DD hh:mm:ss (YYYY: Year (AD), MM: Month (01 - 12), DD: Day (01 - 31), hh: Hour (00 - 23), mm: Minute (00 - 59), ss: Second (00 - 59))

- Serial Number
  The serial number for the SSL / KMIP certificate is displayed. If the certificate is not imported, the field is blank.
  When created, the serial number is combined with the issuer name, which is a unique number in the certificate authority.

11.1.6 Define Role

The registered custom roles in the ETERNUS DX Disk storage system are displayed.
A custom role is a role created by the user in combination of policies, in addition to the default roles.

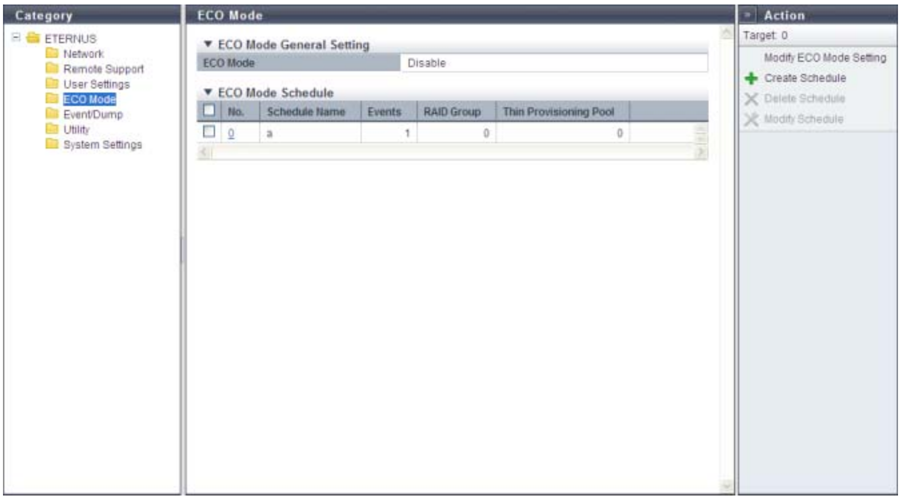


The following items are displayed in the Main area:

- Role
  The custom role name is displayed.

11.1.7 ECO Mode

A list of the ECO mode setting status and the ECO mode schedule that is registered in the ETERNUS DX Disk storage system are displayed.
The ECO mode function schedules the disk operating time in compliance with Massive Arrays of Idle Disks (MAID). It is designed to save power by stopping the disk motors outside of the scheduled disk operating time.



The following items are displayed in the Main area:

- ECO Mode General Setting

- ECO Mode
  The ECO mode setting (enabled or disabled) for all of the ETERNUS DX Disk storage systems is displayed.

- ECO Mode Schedule

- No.
  The schedule number is displayed.
  By clicking this link, the [ECO Mode Schedule] screen is displayed. Refer to "11.1.13 ECO Mode Schedule Detail" (page 733) for display items.
  If the ECO mode is controlled with the Storage Foundation Software ETERNUS SF, a "-" (hyphen) is displayed.

- Schedule Name
  The schedule name is displayed.
  If the ECO mode is controlled with Storage Foundation Software ETERNUS SF, "external" is displayed.

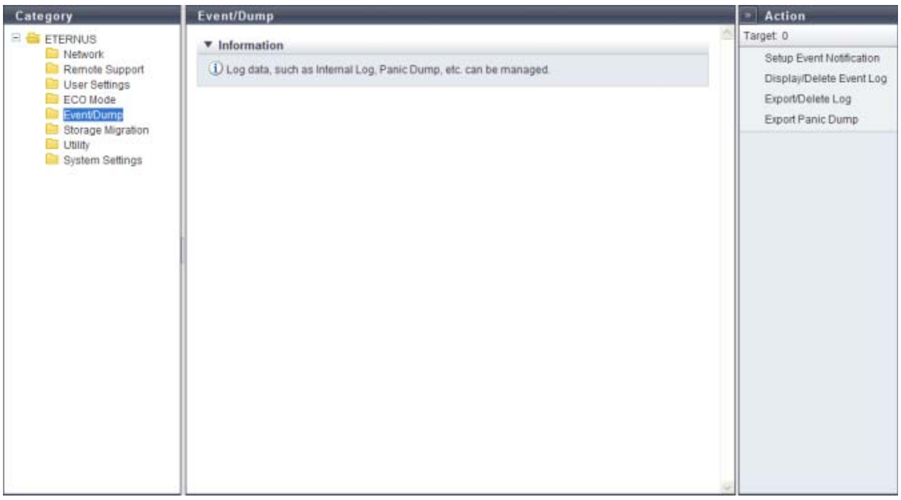
- Events
  The number of events that are registered in the schedule is displayed.
  If the ECO mode is controlled with the Storage Foundation Software ETERNUS SF, a "-" (hyphen) is displayed.

- RAID Group
  The number of RAID groups for which the schedule is allocated to is displayed.

- Thin Provisioning Pool
  The number of Thin Provisioning Pools for which the schedule is allocated to is displayed.

11.1.8 Event/Dump

This function records and displays the event history of the ETERNUS DX Disk storage system as an event log.



11.1.9 Audit Log

This function displays the audit log information.
An audit log records not only operations that are performed by a user, but also how the ETERNUS DX Disk storage system operates for these operations. The audit log function that is provided with the ETERNUS DX80 S2/DX90 S2, the ETERNUS DX410 S2/DX440 S2, and the ETERNUS DX8100 S2/DX8700 S2 transfers the following information to external servers; when an operation is performed, who performed the operation, where the operation was performed, the details of the operation, and the results of the operation.

Caution

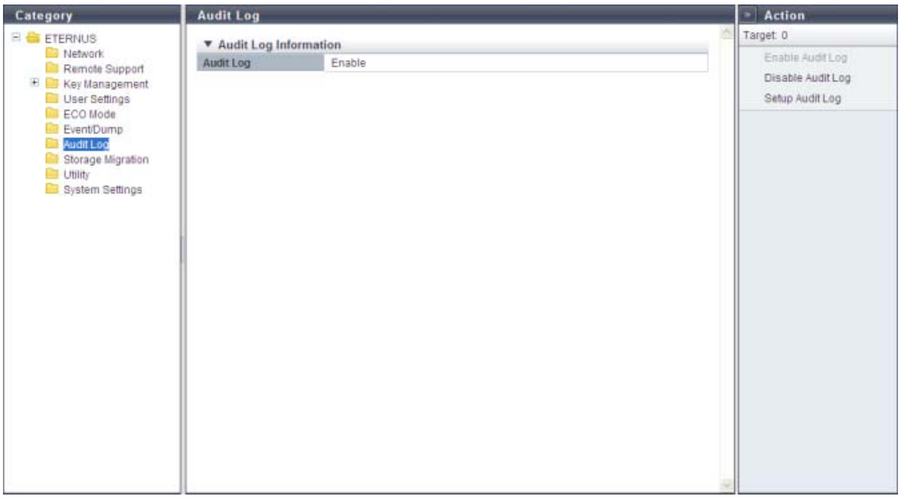
When the procedure in "11.2.10.1 Enable Audit Log" (page 902) is executed, "Enable" is displayed for "Audit Log" in the "Audit Log Information" field even if an external server is not specified. Specify the external server to which the audit log is sent. Refer to "11.2.10.3 Setup Audit Log" (page 903) for details.

Note

Except for the functions that are listed below, the audit log collects all of the information for operations (including logging in and logging out) that are performed via GUI and CLI (including external software).

- Export Cache Parameters
- Export Performance Information
- Convert Copy Path
- Send SNMP Trap Test
- Create Key/CSR
- Download Template File for Storage Migration Settings
- Backup Configuration
- Get G-List (*1)
- All of the display functions (e.g. displaying the volume list or displaying of the RAID group list)

*1: Operations that can be performed when logged in using a user account with the "Maintenance Operation" policy.



The following items are displayed in the Main area:

- Audit Log
  Whether the audit log function is enabled or disabled is displayed.

11.1.10 Storage Migration

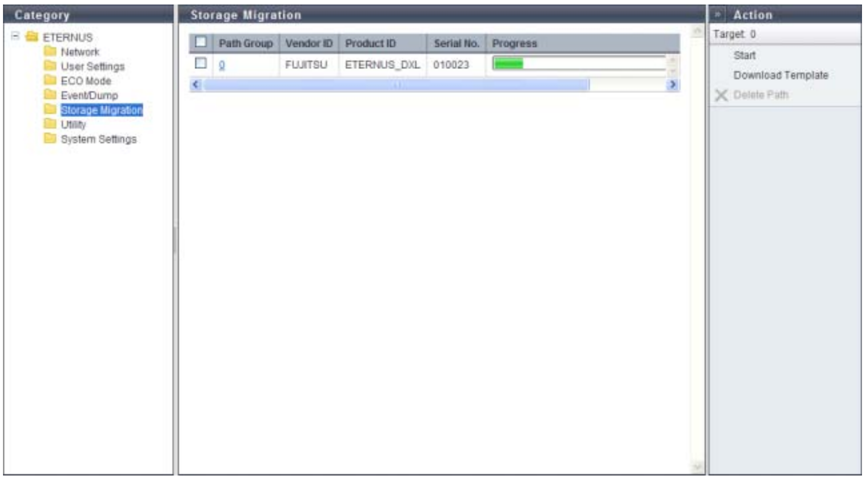
This function displays the setting and progress of Storage Migration.
Storage Migration is the function for migrating data by connecting other storage systems (migration source) and the ETERNUS DX disk storage system (migration destination). Data migration is possible regardless of the server and the OS, and without using server resources.

Caution

- When executing Storage Migration, confirm that there is no access from the host to the source volume and destination volume.
- Do not perform the following operations when there are Storage Migration paths (hereinafter referred to as "path group") established.
  - Configuration of an Advanced Copy source or Advanced Copy destination to the migration destination volume
  - Configuration of an Advanced Copy source or Advanced Copy destination to the migration source volume
  - Formatting of the destination volume
  - RAID diagnosis in the RAID group to which the destination volume belongs
  - Disk diagnosis of the disk drives in the RAID group to which the destination volume belongs
  - CM hot expansion on the destination storage system
  - Memory hot expansion on the destination storage system
- The path groups must be deleted after the data migration is complete. The following operations are not available before path groups are deleted:
  - Concurrent upgrade of firmware at the destination storage system
  - ECO mode schedule setting of the RAID group to which the destination volume belongs
  - ECO mode schedule setting of the Thin Provisioning Pool (TPP) to which the destination volume belongs
  - Capacity expansion of the RAID group to which the destination volume belongs
  - RAID migration of the destination volume
  - Encryption of the destination volume
  - Capacity expansion of the destination volume
  - Deletion of the destination volume
  - Port mode modification of the destination FC-Initiator port
  - Port parameter setting of the destination FC-Initiator port
  - Reduction of the CA to which the destination FC-Initiator port belongs

Note

- Click the [ ] icon to update to the latest screen.
- To start Storage Migration, refer to "11.2.11.1 Start Storage Migration" (page 906).
- A started Storage Migration can be suspended, stopped, and restarted in volume units on the [Path Group Detail Information] screen. Refer to "11.2.11.6 Suspend Storage Migration" (page 917), "11.2.11.7 Stop Storage Migration" (page 918), or "11.2.11.5 Restart Storage Migration" (page 916) for details.



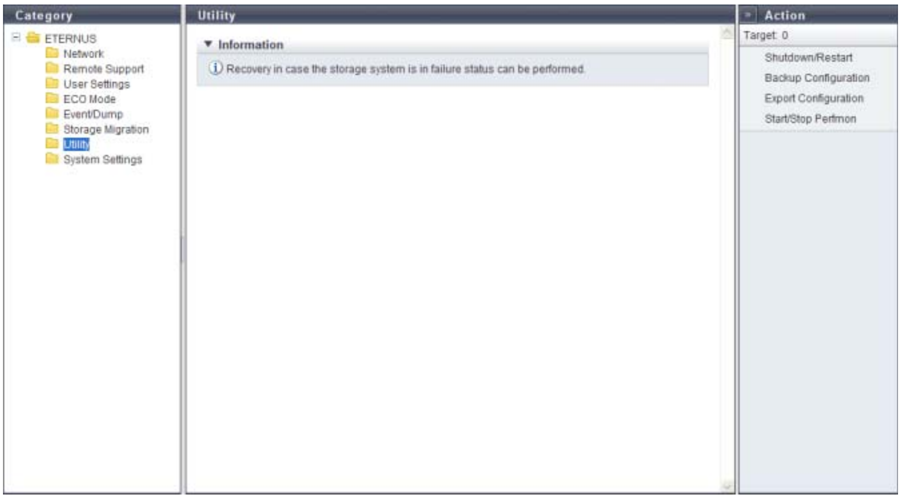
The following items are displayed in the Main area:

- Path Group
  The path group number is displayed. Click this item to display the [Path Group Detail Information] screen. Refer to "11.1.14 Path Group Detail Information" (page 734) for details.
  A path group combines the paths for data migration into a group for each source storage system. The paths from a single source storage system to the ETERNUS DX disk storage system (destination) constitute a path group.
- Vendor ID
  The manufacturer name of the source storage system to which the path is created is displayed.
  An inconvertible code is displayed as "*".
- Product ID
  The product name of the source storage system to which the path is created is displayed.
  An inconvertible code is displayed as "*".
- Serial Number
  The serial number of the source storage system to which the path is established is displayed.
  An inconvertible code is displayed as "*".
- Progress
  The progress of Storage Migration for the path group is displayed.
- Status
  The general status of Storage Migration for the path group is displayed.
  - Complete
    All Storage Migration operations have completed normally.
  - Error
    There are one or more LUNs that do not exist in the migration source volume, or there are one or more volumes for which Storage Migration failed due to error (displayed in red characters).
  - Stop
    Storage Migration has been stopped for one or more volumes (all other volumes have completed Storage Migration normally), or Storage Migration of all the volumes has been stopped.
  - Normal
    Other than above.

  The status display priority order is "Error" > "Normal" > "Stop" > "Complete".

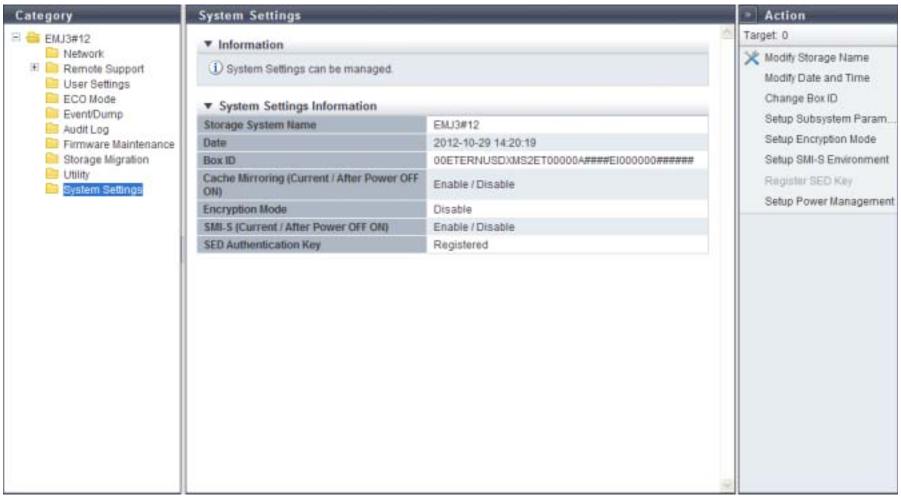
11.1.11 Utility

Descriptions on the actions that can be started from the [Utility] screen are displayed.



11.1.12 System Settings

This function displays the system setting information.



The following items are displayed in the Main area:

Note

For ETERNUS DX8700 S2, "I/O Offloading (Current / After Power OFF ON)" is displayed.

- Storage System Name
  The name for the ETERNUS DX Disk storage system is displayed.

- Date
  The date and time when the event occurs are displayed.
  - YYYY-MM-DD hh:mm:ss (YYYY: Year (AD), MM: Month (01 - 12), DD: Day (01 - 31), hh: Hour (00 - 23), mm: Minute (00 - 59), ss: Second (00 - 59))
- Box ID
  The Box ID is displayed.
  Box ID is the information to be used for application software to define the remote device. The initial Box ID is a device ID that is created by combining device information (series name, model, serial number, etc.).
- Cache Mirroring (Current / After Power OFF ON)
  The current cache mirroring setting and the cache mirroring setting after rebooting is displayed in "Current / After Power OFF ON" format.
  - Enable
  - Disable

Caution

- This item is displayed only when all of the following conditions are satisfied:
  - When logged in using a user account with the "Storage Management" or the "Maintenance Operation" policy
  - When using the ETERNUS DX80 S2/DX90 S2 or the ETERNUS DX410 S2/DX440 S2
- When different settings are specified for "Current" and "After Power OFF ON", reboot the ETERNUS DX Disk storage system.

- I/O Offloading (Current / After Power OFF ON)
  The current I/O offloading setting and the I/O offloading setting after rebooting is displayed in "Current / After Power OFF ON" format.
  - Enable
  - Disable

Caution

- This item is displayed only for ETERNUS DX8700 S2.
- When different settings are specified for "Current" and "After Power OFF ON", reboot the ETERNUS DX Disk storage system.

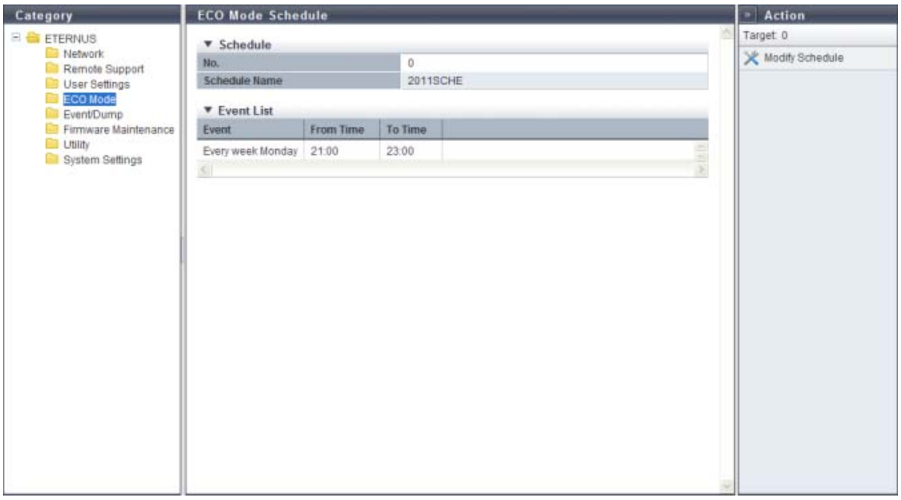
- Encryption Mode
  The encryption mode setting is displayed.
  - Fujitsu Original Encryption
  - AES
  - "-" (hyphen)
- SMI-S (Current / After Power OFF ON)
  The current Storage Management Initiative - Specification (SMI-S) setting and the SMI-S setting after rebooting is displayed in "Current / After Power OFF ON" format.
  - Enable
  - Disable

> **Caution**
>
> When different settings are specified for "Current" and "After Power OFF ON", reboot the ETERNUS DX Disk storage system.

- SED Authentication Key
  Whether the SED authentication key has been "Registered" or "Not Registered" is displayed.

11.1.13 ECO Mode Schedule Detail

In this screen, the detailed information of an ECO mode schedule is displayed.



The following items are displayed in the Main area:

Schedule

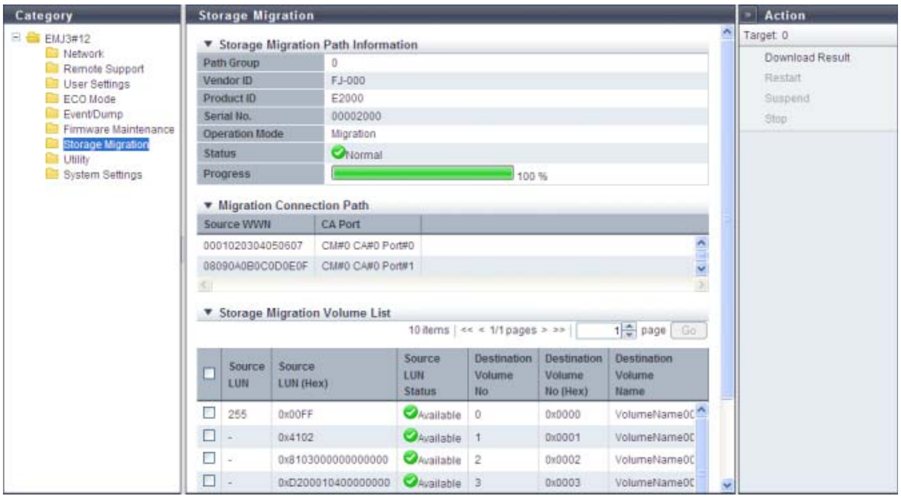
- No.
  The schedule number is displayed.
- Schedule Name
  The schedule name is displayed.

Event List

- Event
  The detailed event information is displayed.
- From Time
  The time at which the event application is started is displayed.
  - hh:mm (hh: Hour, mm: Minute)
- To Time
  The time at which the event application is stopped is displayed.
  - hh:mm (hh: Hour, mm: Minute)

11.1.14 Path Group Detail Information

In this screen, the detailed information of a path group is displayed.



The following items are displayed in the Main area:

Note

Items displayed in this screen vary depending on whether the previous screen is the [Storage Migration] screen or the [Start Storage Migration] screen. When the previous screen is the [Storage Migration] screen, the progress of Storage Migration is checked. When the previous screen is the [Start Storage Migration] screen, the start status of Storage Migration is checked.

- Storage Migration Path Information

  - Path Group
    The path group number is displayed.

  - Vendor ID
    The manufacturer name of the source storage system to which the path is created is displayed.
    An inconvertible code is displayed as "*".

  - Product ID
    The product name of the source storage system to which the path is created is displayed.
    An inconvertible code is displayed as "*".

  - Serial Number
    The serial number of the source storage system to which the path is established is displayed.
    An inconvertible code is displayed as "*".

- Operation Mode
  The operation mode for the path group is displayed.
  When a Storage Migration setting file is in the old format or when a Storage Migration setting file is in the new format and the operation mode setting is omitted, "Migration" is displayed.
  - Migration
    Data migration from the source storage system to the destination storage system is performed.
  - Migration + Quick Compare
    Data migration from the source storage system to the destination storage system and a data comparison of source LUNs and destination volumes are performed. "Quick Compare" compares data in a part of the volume area. "Migration + Quick Compare" consecutively executes "data migration" and "data comparison" for each volume.
  - Migration + Full Compare
    Data migration from the source storage system to the destination storage system and a data comparison of source LUNs and destination volumes are performed. "Full Compare" compares data in entire volume area. "Migration + Full Compare" consecutively executes "data migration" and "data comparison" for each volume.
  - Quick Compare
    A data comparison of source LUNs and destination volumes is performed. "Quick Compare" compares data in a part of the volume area.
  - Full Compare
    A data comparison of source LUNs and destination volumes is performed. "Full Compare" compares data in entire volume area.

  *1: There are two types of template files for Storage Migration setting; new format template files and old format template files. A template file in the new format can be downloaded when the controller firmware version is V10L30 or later. Refer to "11.2.11.2 Download Template File for Storage Migration Settings" (page 912) for details.

- Status
  The general status of Storage Migration for the path group is displayed.
  This item is displayed only when the previous screen is the [Storage Migration] screen.
  - Complete
    All Storage Migration operations have completed normally.
  - Error
    There are one or more LUNs that do not exist in the migration source volume, or there are one or more volumes for which Storage Migration failed due to error (displayed in red characters).
  - Stop
    Storage Migration has been stopped for one or more volumes (all other volumes have completed Storage Migration normally), or Storage Migration of all the volumes has been stopped.
  - Normal
    Other than above.

  The status display priority order is "Error" > "Normal" > "Stop" > "Complete".

- Progress
  The progress of Storage Migration for the path group is displayed.
  This item is displayed only when the previous screen is the [Storage Migration] screen.

Migration Connection Path

- Source WWN
  The WWN for the source FC-CA port is displayed.
- CA Port
  The location information of the destination FC-Initiator is displayed.
  - CM#x CA#y Port#z (x: CM number, y: CA number, z: Port number)

Storage Migration Volume List

- Source LUN
  The source LUN is displayed in decimal number.
  Source LUNs are displayed with decimal numbers if the source LUNs are specified with decimal numbers when Storage Migration setting files are created. Source LUNs are also displayed with decimal numbers if the source LUNs satisfy the conditions for being specified with decimal numbers regardless of whether the Storage Migration setting file is in the new format or the old format. If the source LUNs do not satisfy the conditions for being specified with decimal numbers, a "-" (hyphen) is displayed. Refer to "11.2.11.2 Download Template File for Storage Migration Settings" (page 912) for details.
- Source LUN (Hex)
  The source LUN is displayed in hexadecimal number.
- Source LUN Status
  The status of the source LUN is displayed.
  - Available
    The source LUN can be used
  - Not Available
    The source LUN cannot be used
  - Not Exist
    The source LUN does not exist
- Destination Volume No.
  The destination volume number is displayed in decimal number.
- Destination Volume Name
  The destination volume name is displayed.
- Destination Volume No. (Hex)
  The destination volume number is displayed in hexadecimal number.
- Capacity
  The destination volume capacity is displayed.

- Migration Status
  The data migration status is displayed.
  - Initial
    Initial state
  - Waiting
    Awaiting migration
  - Running
    Migrating
  - Normal End
    Normally completed
  - Suspend
    In suspension
  - Stop
    Stopped
  - Error (xxx)
    (xxx) indicates the error factor.
  - "-" (hyphen)
    Does not exist in the source LUN (the LUN status is "Not Exist").

- Progress
  The data transfer progress is displayed.

- Start Time
- End Time
  The start and end times of data migration are displayed.
  - YYYY-MM-DD hh:mm:ss (YYYY: Year (AD), MM: Month (01 - 12), DD: Day (01 - 31), hh: Hour (00 - 23), mm: Minute (00 - 59), ss: Second (00 - 59))

  The start and end times are displayed as shown below depending on the migration status.

<table>
<tr><th>Migration status</th><th>Start time</th><th>End time</th></tr>
<tr><td>Initial</td><td rowspan="2">The start time is not displayed.</td><td rowspan="3">Blank</td></tr>
<tr><td>Waiting</td></tr>
<tr><td>Running</td><td rowspan="5">The migration start time is displayed.</td></tr>
<tr><td>Normal End</td><td>The migration end time is displayed.</td></tr>
<tr><td>Suspend</td><td>The time when migration suspends is displayed.</td></tr>
<tr><td>Stop</td><td>The time when migration stops is displayed.</td></tr>
<tr><td>Error (xxx)</td><td>The time when migration stops due to error is displayed.</td></tr>
</table>

Caution

- When Storage Migration is restarted when its migration status is "Suspend" or "Error", data migration restarts from the point of suspension. In this case, the start time is not changed.
- When Storage Migration is restarted when its migration status is "Stop", data migration of the LUN is started over from scratch. The start time is changed to the migration restart time.

- Error Location
  The storage system in which a data migration error occurs is displayed.
  If no error is occurred, a "-" (hyphen) is displayed.
  This item is displayed only when the previous screen is the [Storage Migration] screen.
  - Source
    Migration source storage system
  - Destination
    ETERNUS DX Disk storage system (destination storage system)
- Result
  When the source LUN and destination volume are in normal status, the "Result" field is blank.
  An error message is displayed when an error is detected in the source LUN or destination volume.
  This item is displayed only when the previous screen is the [Start Storage Migration] screen.

11.2 Functions in the Action Area for System

When using functions in the Action area, select the desired function from the Action area that is displayed in the status display screen.
The functions in the Action area for System can be performed from the following display functions:

Functions in the Action area for System		Display function
Initial Setup		• System (Basic Information)
Change User Password		• System (Basic Information)
Set SSH Public Key		• System (Basic Information)
Network Management		–
	Setup Network Environment	• Network
	Setup Firewall	
	Setup SNMP Agent Basic Interface	
	Setup SNMP Manager	
	Setup SNMP Agent MIB Access View	
	Setup SNMP Agent User	
	Setup SNMP Agent Community	
	Setup SNMP Agent Trap	
	Download MIB File	
	Send SNMP Trap Test	
	Display SMTP Log	
	Setup E-Mail Notification	
	Setup Syslog	
	Setup SSH Server Key	
	Create Self-signed SSL Certificate	
	Create Key/CSR	
	Register SSL Certificate	
Remote Support (REMCS) for Regions other than EMEA		–
	Display Communication Log	• Remote Support (REMCS) for Regions other than EMEA
	Setup Remote Support	
	Update Customer Information	
	Update Communication Environment Information	
	Setup Log Sending Parameters	
	Stop/Restart Remote Support	

Functions in the Action area for System		Display function
Remote Support (AIS Connect) for Regions other than Japan		–
	Setup AIS Connect Environment	• Remote Support (AIS Connect) for Regions other than Japan
	Setup Remote Session Permission	
	Send Log	
	Test Server Connectivity	
	Send AIS Connect Test Event	
	Import Root Certificate	Root Certificate
Key Management		–
	Setup Key Management Machine Name	• Key Management
	Add Key Server	
	Delete Key Server	
	Modify Key Server	
	Create Key Group	• Key Group
	Delete Key Group	
	Modify Key Group	
	Update SED Authentication Key	
	Import SSL/KMIP Certificate	
Define Role		–
	Setup User Account	• Define Role
	Initialize User Account	
	Modify RADIUS	
	Add Role	
	Delete Role	
	Modify Role	
ECO Mode Management		–
	Modify ECO Mode General Setting	• ECO Mode
	Create ECO Mode Schedule	
	Delete ECO Mode Schedule	
	Modify ECO Mode Schedule	
Event/Dump Management		–
	Setup Event Notification	• Event/Dump
	Display Event Log	
	Export/Delete Log	
	Export Panic Dump	
Audit Log Management		–
	Enable Audit Log	• Audit Log
	Disable Audit Log	
	Setup Audit Log	

Functions in the Action area for System		Display function
Storage Migration Management		–
	Start Storage Migration	• Storage Migration
	Download Template File for Storage Migration Settings	
	Delete Storage Migration Path	
	Download Storage Migration Result	
	Restart Storage Migration	
	Suspend Storage Migration	
	Stop Storage Migration	
Utility Management		–
	Shutdown/Restart Storage System	• Utility
	Backup Configuration	
	Export Configuration	
	Start/Stop Performance Monitoring	
System Management		–
	Modify Storage System Name	• System Settings
	Modify Date and Time	
	Change Box ID	
	Setup Subsystem Parameters	
	Setup Encryption Mode	
	Setup SMI-S Environment	
	Setup Power Management	

11.2.1 Change User Password

This function changes the current user's (your) password.

Caution

When RADIUS Authentication is used for login, the password cannot be changed.

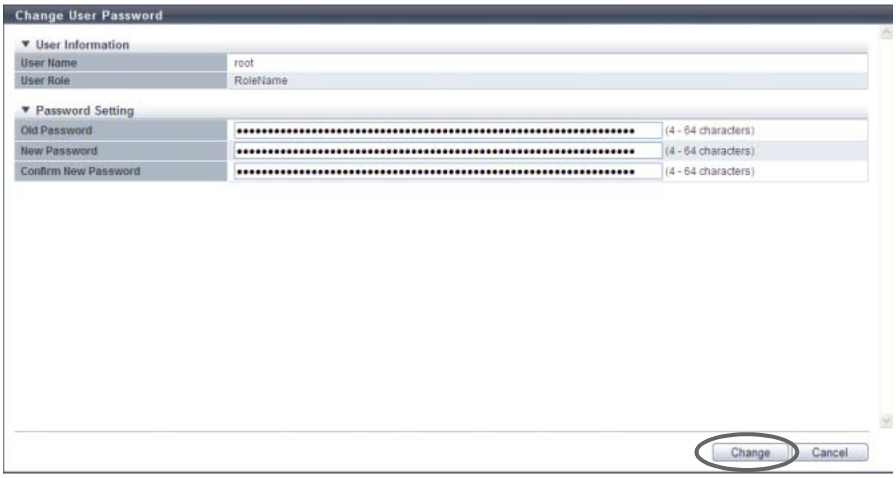
The procedure to change the password is as follows:

Procedure

1 Click [Change User Password] in [Action].

2 Specify the parameters, and click the [Change] button.

- Old Password
  Input the current password.
  The following input condition applies:
  - 4 - 64 alphanumeric characters and symbols ('!', '-', '_', '.')
- New Password
  Input a new password.
  Entered letters are case-sensitive.
  The following input condition applies:
  - 4 - 64 alphanumeric characters and symbols ('!', '-', '_', '.')
- Confirm New Password
  Input the same character string as the value entered in the "New Password" field for confirmation.



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When "Old Password", "New Password", and/or "Confirm New Password" is not input
- When a parameter does not satisfy the input conditions
- When the current password does not match "Old Password"
- When "New Password" does not match "Confirm New Password"

3 Click the [OK] button.



→ Changing of the user password starts.

4 Click the [Done] button to return to the [System] screen.

End of procedure

11.2.2 Set SSH Public Key

This function registers, changes, or deletes the current user's (your) SSH client public key.

Caution

- When using the SSH Client Key authentication, create a pair of the SSH client public key and the SSH client secret key in advance, using the creation tool. One public key can be registered per user account. When this function is executed, the public key is registered in the ETERNUS DX Disk storage system.
- The following types (formats) of public keys can be used:
  - OpenSSH style RSA for SSH v1
  - IETF style DSA for SSH v2
  - IETF style RSA for SSH v2

  The maximum of encryption strength of the supported public key is 4096-bit.

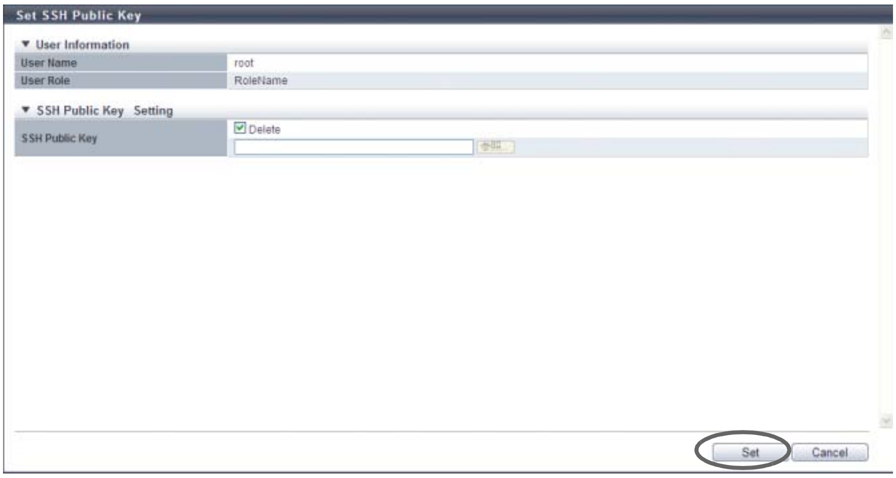
The procedure to set the SSH public key is as follows:

Procedure

1 Click [Set SSH Public Key] in [Action].

2 Specify the SSH Public Key, and click the [Set] button.

- Delete checkbox
  To delete the current user's (your) SSH client public key, select the checkbox.
  The checkbox is displayed only when the SSH client public key has been registered.
- SSH Public Key
  Register or change the SSH client public key used for login authentication from CLI in the ETERNUS DX Disk storage system.
  Click the [Browse...] button and specify the public key to be registered or to be changed.
  When using the SSH Client Key authentication, register the SSH public key in the ETERNUS DX Disk storage system and prepare the SSH secret key, corresponding to the public key in the client PC in advance.



Note

To delete the SSH client public key, select the "Delete" checkbox and click the [Set] button.

→ A confirmation screen appears.

3 Click the [OK] button.



→ The registration of the SSH client public key starts.

4 Click the [Done] button to return to the [System] screen.

End of procedure

11.2.3 Network Management

This section describes the network environment settings.
The following functions are available for the network environment settings:

- Setup Network Environment
- Setup Firewall
- Setup SNMP Agent Basic Interface
- Setup SNMP Manager
- Setup SNMP Agent MIB Access View
- Setup SNMP Agent User
- Setup SNMP Agent Community
- Setup SNMP Agent Trap
- Download MIB File
- Send SNMP Trap Test
- Display SMTP Log
- Setup E-Mail Notification
- Setup Syslog
- Setup SSH Server Key
- Create Self-signed SSL Certificate
- Create Key/CSR
- Register SSL Certificate

11.2.3.1 Setup Network Environment

This function sets up an the environment for the ETERNUS DX Disk storage system to communicate with an external network.
The IP address, subnet mask (prefix length), gateway, DNS server of the ETERNUS DX Disk storage system, and network address for the remote operation from outside of the subnet can be configured. Configuration is required for each MNT, RMT and FST port.

- MNT port
  The MNT port is used for general communication between the ETERNUS DX Disk storage system and the external hosts.
- RMT port
  The RMT port is used when the line must be separated from the MNT port.
- FST port
  The FST port is used for maintaining the ETERNUS DX Disk storage system.

Caution

- When SNMP Manager exists in a different subnetwork from where the ETERNUS DX Disk storage system belongs, specify the IP address or the network address of SNMP Manager in the "Allowed IP List" using the procedure in "11.2.3.1 Setup Network Environment" (page 745).
- Logging in again may be required after the settings are complete.
- The following table shows the operations that can be performed for each port type according to the model.

Model	MNT port			RMT port			FST port		
	Setting	Modifi-cation	Deletion	Setting	Modifi-cation	Deletion	Setting	Modifi-cation	Deletion
ETERNUS DX80 S2	OK	OK	N/A (*1)	OK	OK	OK	N/A	–	–
ETERNUS DX90 S2	OK	OK	N/A (*1)	OK	OK	OK	N/A	–	–
ETERNUS DX410 S2	OK	OK	OK (*2)	OK	OK	OK (*2)	OK	OK	N/A
ETERNUS DX440 S2	OK	OK	OK (*2)	OK	OK	OK (*2)	OK	OK	N/A
ETERNUS DX8100 S2	OK	OK	OK (*2)	OK	OK	OK (*2)	OK	OK	N/A
ETERNUS DX8700 S2	OK	OK	OK	OK	OK	OK	OK	OK	N/A

OK: Available N/A: Not available –: Not supported

*1: Either an IPv4 or an IPv6 address must be set for the target port.

*2: If the FST port is not specified, the settings for either the MNT port or the RMT port must be specified even when the target port setting is deleted.

Note

- MNT ports and RMT ports support both "IPv4" and "IPv6". FST ports only support "IPv4".
- Both or either "IPv4 address" and "IPv6 address" can be set for a port.
- To enable or disable each service (such as HTTP and HTTPS), use the procedure in "11.2.3.2 Setup Firewall" (page 758).

When using IPv4

The procedure to set network environment using IPv4 address is as follows:

Procedure

1 Click [Setup Network] in [Action].

2 Select the network port and specify each item.

Select Network Port

- Network Port
  Select the port to configure from "MNT", "RMT", and "FST".
  - For ETERNUS DX80 S2/DX90 S2: MNT or RMT
  - For ETERNUS DX410 S2/DX440 S2: MNT, RMT, or FST
  - For ETERNUS DX8100 S2/DX8700 S2: MNT, RMT, or FST

Interface

- Master IP Address
  Input the IP address for the Master CM of the ETERNUS DX Disk storage system. (*1)
- Slave IP Address
  Input the IP address for the Slave CM of the ETERNUS DX Disk storage system. (*1)
  The IP address of the Slave CM is used when an error occurs in the Master CM.
  This item is not displayed for the 1CM model.
  - Subnet Mask
  Input the subnet mask of the ETERNUS DX Disk storage system. (*1)
- Gateway
  Input the IP address of the gateway. (*1)
  This item is not displayed when an FST port is selected.

DNS

This item is not displayed when an FST port is selected.

- Primary DNS
  Input the IP address of the Primary DNS server. (*1)
- Secondary DNS
  Input the IP address of the Secondary DNS server. (*1)
  The Secondary DNS server must be specified after the Primary DNS server.

LAN

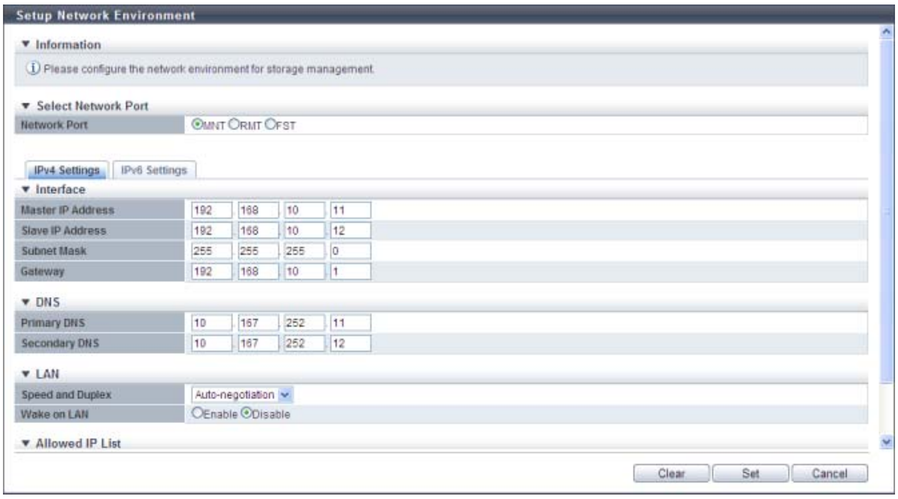
- Speed and Duplex
  Select the communication speed and mode.
  - Auto-negotiation
  - 1Gbit/s
  - 100Mbit/s Half
  - 100Mbit/s Full
  - 10Mbit/s Half
  - 10Mbit/s Full
- Wake on LAN
  Select whether to enable or disable the WOL function (*2).
  This item is not displayed when an FST port is selected.

*1: Input numeric characters ("0" - "255") for all the text boxes.

*2: The WOL function starts up the ETERNUS DX Disk storage system, which is connected to LAN, from another server or a PC via network.

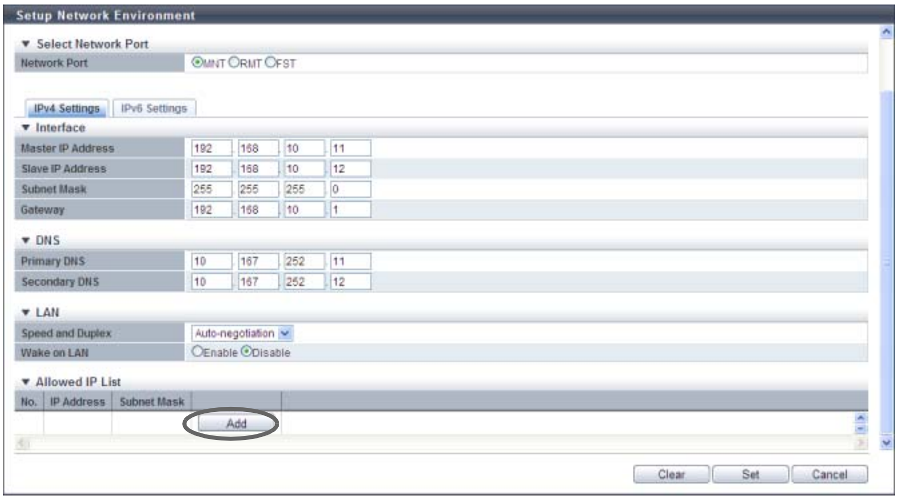
Note

When two CMs are installed, a CM, to which authority to manage the ETERNUS DX Disk storage system has been given, is called a "Master CM". The other CM is called a "Slave CM". When an error occurs in a CM or a LAN, the Master CM is automatically switched, and the IP address of the old Master CM is passed to the new Master CM. By specifying the IP address of the Slave CM, the Master CM can be forcibly switched to the Slave CM when an error occurs and the Master CM cannot be connected.



→ Returns to the [Setup Network Environment] screen.

3 To allow access from a different subnetwork to the ETERNUS DX Disk storage system, click the [Add] button.



→ The [Add Allow IP] screen appears.

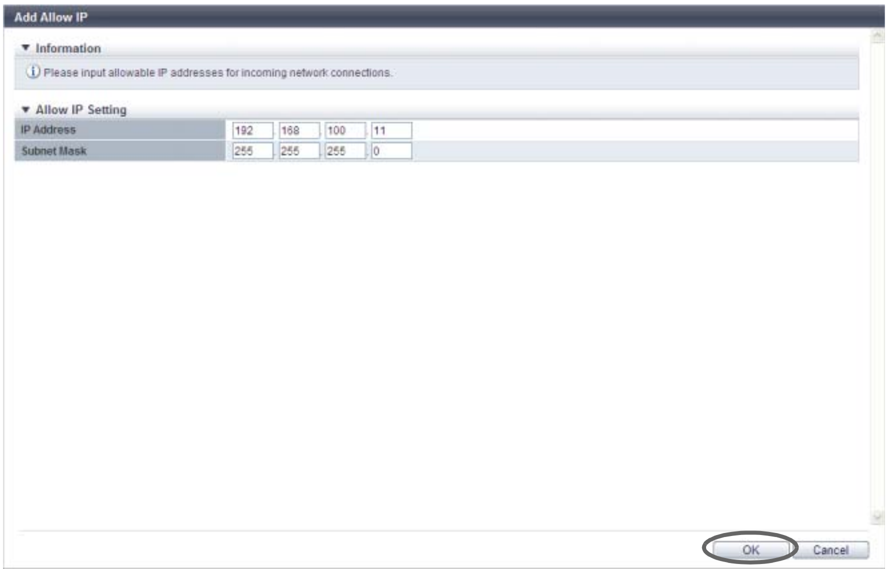
4 Input the IP address and the subnet mask, and then click the [OK] button.

If the gateway is specified, the information of the remote devices for which network access will be allowed can be input.

Allow IP Setting

- IP Address
  Input the IP address (or the network address) for the remote device. (*1)
  Up to 16 addresses can be registered.
  Make sure to input the IP address (or the network address) and subnet mask together.
- Subnet Mask
  Input the subnet mask for the IP address (or the network address) of the remote device. (*1)

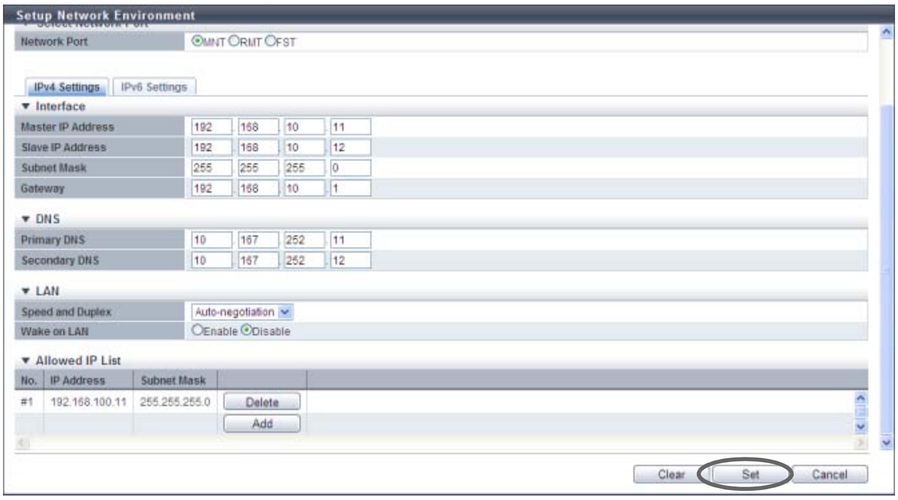
  *1: Input numeric characters ("0" - "255") for all the text boxes.



→ Returns to the [Setup Network Environment] screen.

5 Repeat Step 3 and Step 4 when registering several IP addresses.

6 After registering the IP address is complete, click the [Set] button.

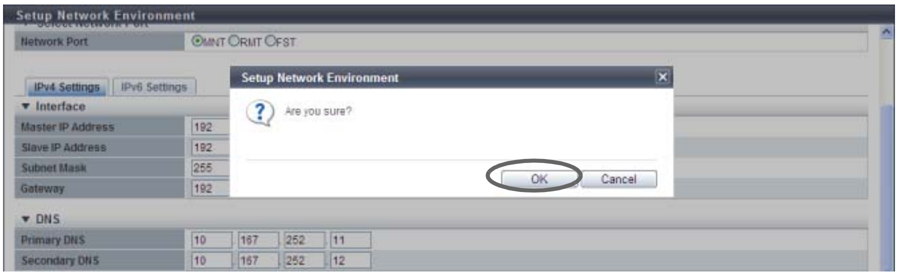


→ A confirmation screen appears.

Caution

- When specifying the IP address or the subnet mask, note the following:
  - IP addresses must be specified with the IPv4 format
  - The IP address of the RMT port must be in a different subnetwork from the MNT port
  - Specify the IP address of the Slave CM when connecting to the Slave CM. The IP address of the Slave CM must be in the same subnetwork as the Master CM
  - Specify the IP address of "Gateway" when allowing access from outside of the subnetwork. The IP address must be in the same subnetwork as the port
  - For "Allowed IP List", specify the IP address or the network address that allows access to the ETERNUS DX Disk storage system. These settings are not required for access from the network address (same subnetwork) which the ETERNUS DX Disk storage system belongs to
- Click the [Clear] button to delete setting parameters.
- When using the ETERNUS DX80 S2/DX90 S2, the MNT port setting cannot be deleted.
- When using the ETERNUS DX410 S2/DX440 S2 or the ETERNUS DX8100 S2/DX8700 S2, the FST port setting cannot be deleted.

7 Click the [OK] button.



→ The network environment setting starts.

8 Click the [Done] button to return to the [Network] screen.

> **Caution**
>
> Device management operation cannot be continued if the IP address of the ETERNUS DX Disk storage system has been changed. Logging in again with the new IP address is required.

End of procedure

When using IPv6

The procedure to set network environment using IPv6 address is as follows:

Procedure

1 Click [Setup Network] in [Action].

2 Select the network port and specify each item.

- Select Network Port

- Network Port
  Select the port to configure from "MNT", "RMT", and "FST".
  - For ETERNUS DX80 S2/DX90 S2: MNT or RMT
  - For ETERNUS DX410 S2/DX440 S2: MNT, RMT, or FST
  - For ETERNUS DX8100 S2/DX8700 S2: MNT, RMT, or FST

- Interface

- Master IP Link Local Address
  Input the link local address (interface ID) for the Master CM of the ETERNUS DX Disk storage system.
  Note that the link local address is only available within the same network and cannot be connected to the Internet. Connection via a router is not available.
  Refer to "Available IPv6 Address" (page 757) for details.
  Note that the current setting is displayed by an abbreviation.
  The following input condition applies:
  - fe80::xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
    Refer to "IPv6 Address Notation (Setup Network Environment)" (page 757) for details.
- Master Connect IP Address
  Input the connect IP address for the Master CM of the ETERNUS DX Disk storage system.
  "Master Connect IP Address" corresponds to "Master IP Address" for IPv4.
  The following IPv6 addresses can be used; "global address", "unique local address", and "6to4 address". Refer to "Available IPv6 Address" (page 757) for details.
  Note that the current setting is displayed by an abbreviation.
  The following input condition applies:
  - xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
    Refer to "IPv6 Address Notation (Setup Network Environment)" (page 757) for details.

- Slave IP Link Local Address
  Input the link local address (interface ID) for the Slave CM of the ETERNUS DX Disk storage system.
  The link local address of the Slave CM is used when an error occurs in the Master CM.
  Refer to "Available IPv6 Address" (page 757) for details.
  This item is not displayed for the 1CM model.
  Note that the current setting is displayed by an abbreviation.
  The following input condition applies:
  - fe80::xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
    Refer to "IPv6 Address Notation (Setup Network Environment)" (page 757) for details.
- Slave Connect IP Address
  Input the connect IP address for the Slave CM of the ETERNUS DX Disk storage system.
  The connect IP address of the Slave CM is used when an error occurs in the Master CM.
  "Slave Connect IP Address" corresponds to "Slave IP Address" for IPv4.
  The following IPv6 addresses can be used; "global address", "unique local address", and "6to4 address". Refer to "Available IPv6 Address" (page 757) for details.
  This item is not displayed for the 1CM model.
  Note that the current setting is displayed by an abbreviation.
  The following input condition applies:
  - xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
    Refer to "IPv6 Address Notation (Setup Network Environment)" (page 757) for details.
- Length of Subnet Prefix
  Input the prefix length of the connect IP address (unit: bit).
  "Length of Subnet Prefix" corresponds to "Subnet Mask" for IPv4.
  Refer to "Available IPv6 Address" (page 757) for details.
- Gateway
  Input the IP address of the gateway.
  The following IPv6 addresses can be used; "link local address", "global address", "unique local address", and "6to4 address". Refer to "Available IPv6 Address" (page 757) for details.
  Note that the current setting is displayed by an abbreviation.
  The following input condition applies:
  - xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
    Refer to "IPv6 Address Notation (Setup Network Environment)" (page 757) for details.

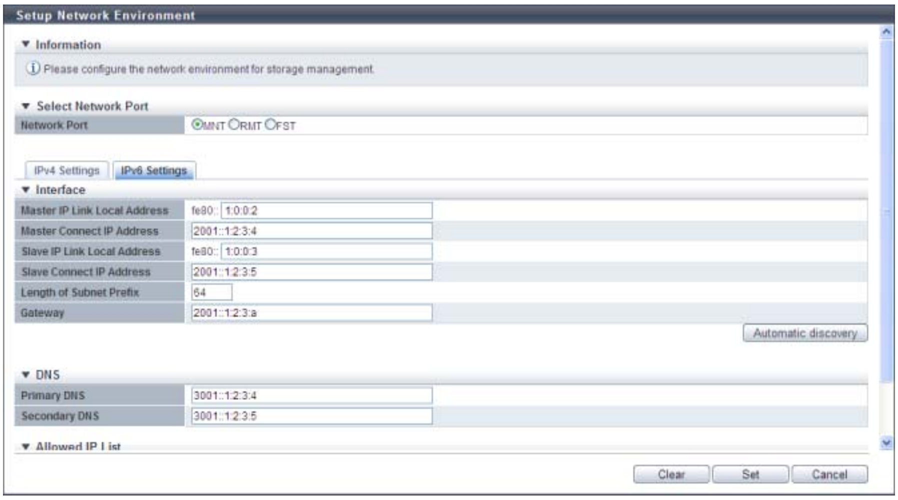
DNS

- Primary DNS
  Input the IP address of the Primary DNS server.
  The following IPv6 addresses can be used; "global address", "unique local address", and "6to4 address". Refer to "Available IPv6 Address" (page 757) for details.
  Note that the current setting is displayed by an abbreviation.
  The following input condition applies:
  - xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
    Refer to "IPv6 Address Notation (Setup Network Environment)" (page 757) for details.

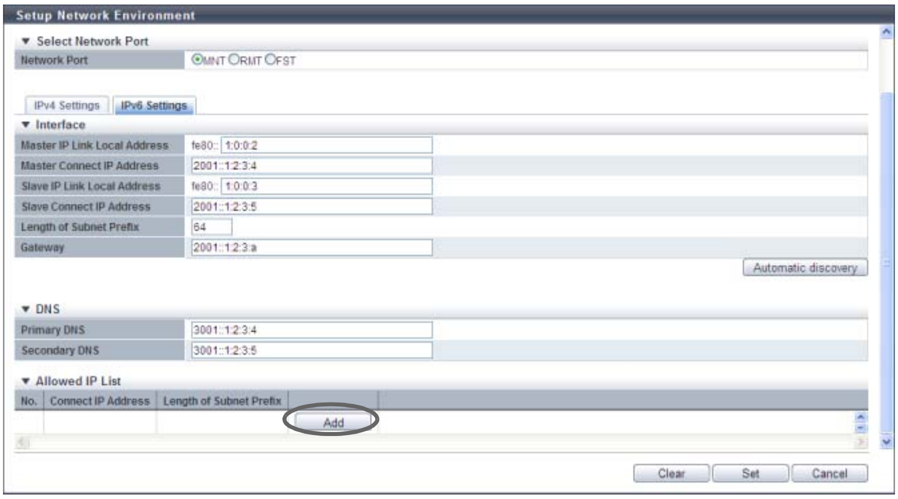
- Secondary DNS
  Input the IP address of the Secondary DNS server.
  The Secondary DNS server must be specified after the Primary DNS server.
  The following IPv6 addresses can be used; "global address", "unique local address", and "6to4 address". Refer to "Available IPv6 Address" (page 757) for details.
  Note that the current setting is displayed by an abbreviation.
  The following input condition applies:
  - xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
    Refer to "IPv6 Address Notation (Setup Network Environment)" (page 757) for details.

Note

- Click the [Automatic discovery] button to automatically obtain "Master IP Link Local Address", "Master Connect IP Address", "Slave IP Link Local Address", "Slave Connect IP Address", "Length of Subnet Prefix", and "Gateway". Input the IPv6 address of the DNS server if required.
- When two CMs are installed, a CM, to which authority to manage the ETERNUS DX Disk storage system has been given, is called a "Master CM". The other CM is called a "Slave CM". When an error occurs in a CM or a LAN, the Master CM is automatically switched, and the IP address of the old Master CM is passed to the new Master CM. By specifying the IP address of the Slave CM, the Master CM can be forcibly switched to the Slave CM when an error occurs and the Master CM cannot be connected.



3 To allow access from a different subnetwork to the ETERNUS DX Disk storage system, click the [Add] button.



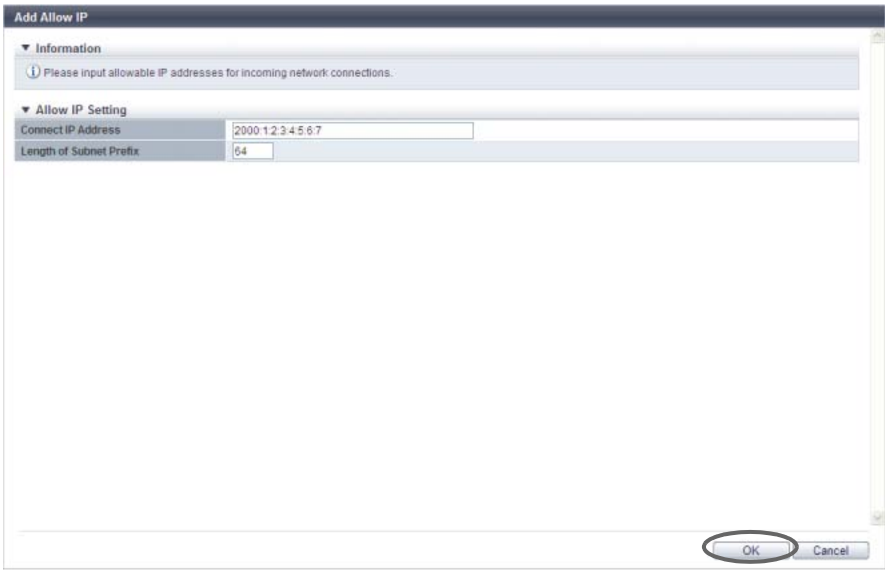
→ The [Add Allow IP] screen appears.

4 Input "Connect IP Address" and "Length of Subnet Prefix", and click the [OK] button.

● Allow IP Setting

- Connect IP Address
  Input the connect IP address that is to be displayed.
  The following IPv6 addresses can be used; "global address", "unique local address", and "6to4 address". Refer to "Available IPv6 Address" (page 757) for details.
  The following input condition applies:
  - xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
    Refer to "IPv6 Address Notation (Setup Network Environment)" (page 757) for details.

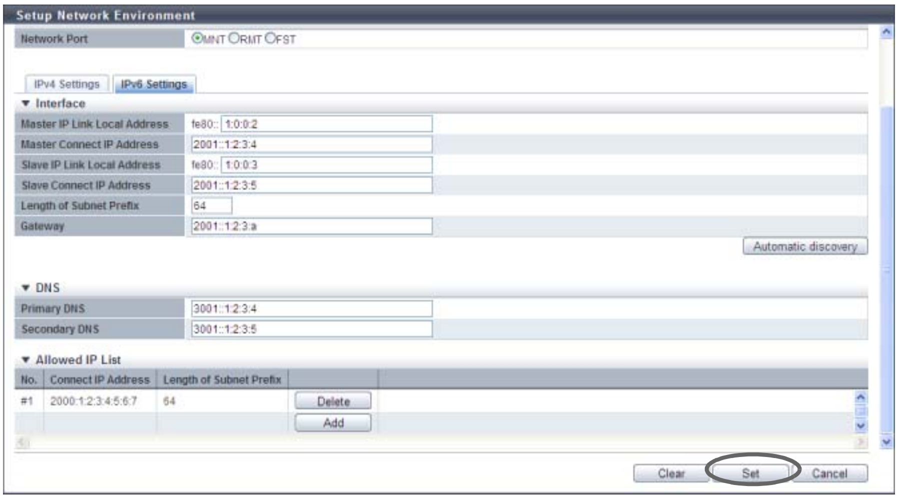
  Make sure to input "Connect IP Address" and "Length of Subnet Prefix" together.
- Length of Subnet Prefix
  Input the prefix length of the connect IP address for the remote device (unit: bit).
  Refer to "Available IPv6 Address" (page 757) for details.



→ Returns to the [Setup Network Environment] screen.

5 Repeat Step 3 and Step 4 when registering several connect IP addresses.

6 After registering the connect IP address is complete, click the [Set] button.

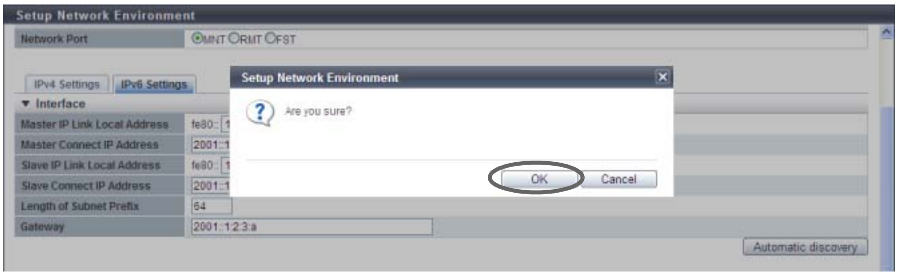


→ A confirmation screen appears.

Caution

- Note the following points when specifying an IP address:
  - IP addresses must be specified with the IPv6 format. Refer to "IPv6 Address Notation (Setup Network Environment)" (page 757) for details
  - The connect IP address of the RMT port must be in a different subnetwork from the MNT port
  - Specify the connect IP address of the Slave CM when connecting to the Slave CM The connect IP address of the Slave CM must be in the same subnetwork as the Master CM
  - Specify the IP address of "Gateway" when allowing access from outside of the subnetwork The IP address must be in the same subnetwork as the port
  - For "Allowed IP List", specify the IP address or the network address that allows access to the ETERNUS DX Disk storage system. These settings are not required for access from the network address (same subnetwork) which the ETERNUS DX Disk storage system belongs to
- Click the [Clear] button to delete setting parameters
- When using the ETERNUS DX80 S2/DX90 S2, the MNT port setting cannot be deleted
- When using the ETERNUS DX410 S2/DX440 S2 or the ETERNUS DX8100 S2/DX8700 S2, the FST port setting cannot be deleted

7 Click the [OK] button.



→ The network environment setting starts.

8 Click the [Done] button to return to the [Network] screen.

Caution

Device management operation cannot be continued if the IP address of the ETERNUS DX Disk storage system has been changed. Logging in again with the new IP address is required.

End of procedure

Available IPv6 Address

No.	Allocated addresses	Settable range for addresses	Length of subnet prefix
1	Global address	2000::1 - 3fff:ffff:ffff:ffff:ffff:ffff:ffff:ffff	3 - 128
2	Unique local address	fc00::1 - fdff:ffff:ffff:ffff:ffff:ffff:ffff:ffff	7 - 128
3	Link local address	fe80::1 - fe80::ffff:ffff:ffff:ffff	64-bit static IP address
4	6to4 address	2002:<IPv4 address in hexadecimal>::1 - 2002:<IPv4 address in hexadecimal>::ffff:ffff:ffff:ffff	48 - 128

IPv6 Address Notation (Setup Network Environment)

Since the IPv6 address is 128-bit and extremely long, this address is displayed using "xxxx", which describes 16-bit in hexadecimals as being one block that is separated by colons (":").

xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx

- Use 0 - ffff (FFFF) (hexadecimal, alphanumeric characters) for inputting an IPv6 address.
- The current setting is displayed with 0 - ffff (hexadecimal, "a" - "f" are lowercase letters)
- Up to 128-bit
- The first 64-bit (prefix) of the link local address is fixed to "fe80::".

The following three abbreviation methods are available for IPv6 addresses:

(1) Omission of the first "0" of a block that follows consecutive zeros.

[Example] 2001:1000:0120:0000:0000:0123:0000:0000

2001:1000:120:0000:0000:123:0000:0000

(2) Replacement of "0000" blocks with "0".

[Example] 2001:1000:120:0000:0000:123:0000:0000

2001:1000:120:0:0:123:0:0

(3) Replacement of a block with consecutive zeros by "::" is performed only once.

[Example] 2001:1000:120:0:0:123:0:0

2001:1000:120::123:0:0 is OK

2001:1000:120::123:: is not allowed

(Replacement of a block with consecutive zeros by "::" is allowed only once.)

Caution

The following IP addresses cannot be specified:

- Link local addresses for which all of the values for the low 64-bit are "0"
- Connect IP addresses (*1) for which the first 3-bit are not "001" or the first 7-bit are not "1111110"

*1: The connect IP address indicates a "global address", "unique local address", or "6to4 address".

- The first 64-bit of the gateway is "fe80::" and all of the values for low 64-bit are "0"
- Network addresses for which the first 3-bit of the gateway are "001"
- Network addresses for which the first 7-bit of the gateway are "1111110"
- DNS server IP addresses for which the first 3-bit are not "001" or the first 7-bit are not "1111110"

■ Supplementary Information

- When accessing of the ETERNUS DX Disk storage system from a different subnetwork is not allowed
  Specify "IP Address" and "Subnet Mask" of the ETERNUS DX Disk storage system.
  Only accessing from the same subnetwork is allowed.
- When accessing of the ETERNUS DX Disk storage system from a different subnetwork is allowed (*1)
  Specify "Gateway" and "Allowed IP List ("IP Address" (or the network address) and "Subnet Mask")".

  *1: Allowing access from a different subnetwork is required when using GUI or CLI of PCs in a different network to log in to the ETERNUS DX Disk storage system. Allowing access from a different subnetwork is also required when using Systemwalker Centric Manager or SNMP Manager that is connected to a different subnetwork to monitor the ETERNUS DX Disk storage system.

  [Example] Allowed IP List (for IPv4)

  - When accessing of the ETERNUS DX Disk storage system from a specific client outside the subnetwork is allowed, specify "IP Address" and "Subnet Mask".
    IP Address: 10.20.30.40
    Subnet Mask: 255.255.255.0
  - When accessing of the ETERNUS DX Disk storage system from a specific subnetwork outside the subnetwork is allowed, specify "Network Address" and "Subnet Mask".
    IP Address: 10.20.30.0
    Subnet Mask: 255.255.255.0

  For IPv6, "IP Address" corresponds to "Connect IP Address", and "Subnet Mask" corresponds to "Length of Subnet Prefix".

11.2.3.2 Setup Firewall

This function configures a firewall for each service.
Configuration is required for each MNT, RMT and FST port.

- MNT port
  The MNT port is used for general communication between the ETERNUS DX Disk storage system and the external hosts.
- RMT port
  The RMT port is used when the line must be separated from the MNT port.
- FST port
  The FST port is used for maintaining the ETERNUS DX Disk storage system.

Caution

- The FST port settings are only required when the storage system is ETERNUS DX410 S2/DX440 S2 or ETERNUS DX8100 S2/DX8700 S2.
- If both the HTTP connection and the HTTPS connection have been disabled, GUI cannot access the ETERNUS DX Disk storage system.
- If both the Telnet connection and the SSH connection have been disabled, CLI cannot access the ETERNUS DX Disk storage system.
- If ports of all the services are disabled, access to the ETERNUS DX Disk storage system is not allowed.
- When the firewall setting is changed, it takes approximately 10 seconds to update the storage system information. To display the most recently updated screen, wait at least 10 seconds and click the [ ] icon in the [Network] screen or click [Network] in the category.

Note

- To configure the network environment of the ETERNUS DX Disk storage system, use the procedure in "11.2.3.1 Setup Network Environment" (page 745).
- The following table shows the protocols, the port numbers, and the direction for each service.

Service	Protocol	Port number	Direction (*1)
Web GUI	HTTP	80	from
	HTTPS	443	from
CLI	Telnet	23	from
	SSH	22	from
Ping	ICMP	–	from
Maintenance Secure	Unique protocol	1372	from
SNMP (excluding SNMP trap)	SNMP	161	from
RCIL	IPMI	623	from

*1: The direction of the first communication. "From" indicates that the first communication is performed from an external server or an external client to the ETERNUS DX Disk storage system.

The procedure to set a firewall is as follows:

Procedure

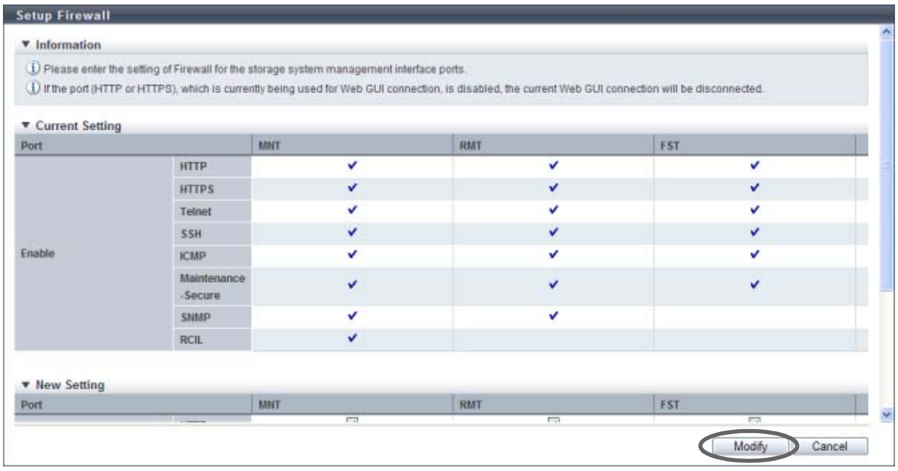
1 Click [Setup Firewall] in [Action].

2 Specify whether to enable or disable the connection of each service, and click the [Modify] button.

New Setting

- HTTP
  Specify whether to enable or disable the HTTP connection. Select the checkbox to enable the connection.
  HTTP is used when accessing from GUI.
- HTTPS
  Specify whether to enable or disable the HTTPS connection. Select the checkbox to enable the connection.
  HTTPS is used when accessing from GUI. This connection uses the data encryption for data transferring.
- Telnet
  Specify whether to enable or disable the Telnet connection. Select the checkbox to enable the connection.
  Telnet is used when accessing from CLI.
- SSH
  Specify whether to enable or disable the SSH connection. Select the checkbox to enable the connection.
  Secure Shell (SSH) is used when accessing from CLI. This connection uses the data encryption for data transferring.

- ICMP
  Specify whether to enable or disable the ICMP connection. Select the checkbox to enable the connection.
  The Internet Control Message Protocol (ICMP) is used when sending the ping command from a PC.
- Maintenance-Secure
  Specify whether to enable or disable the Maintenance-Secure connection. Select the checkbox to enable the connection.
  Maintenance Secure is used when connecting with the monitoring software, or performing a firmware update from the peer storage system using the Remote Support function. This connection uses the data encryption for data transferring.
- SNMP
  Specify whether to enable or disable the SNMP connection. Select the checkbox to enable the connection.
  The Simple Network Management Protocol (SNMP) is used when accessing from SNMP Manager.
- RCIL
  Specify whether to enable or disable the RCIL connection. Select the checkbox to enable the connection.
  Whether to enable or disable RCIL can only be set for the MNT port. The Remote Cabinet Interface over LAN (RCIL) controls the power of the ETERNUS DX Disk storage system from a host via Ethernet by using the Intelligent Platform Management Interface (IPMI), which is a general protocol.



→ A confirmation screen appears.

3 Click the [OK] button.



→ Setting of the firewall starts.

4 Click the [Done] button to return to the [Network] screen.

End of procedure

11.2.3.3 Setup SNMP Agent Basic Interface

This function sets up the SNMP Agent basic interface in the ETERNUS DX Disk storage system.
SNMP is a standard protocol used for network management.

Caution

- When SNMP Manager exists in a different subnetwork from where the ETERNUS DX Disk storage system belongs, specify the IP address or the network address of SNMP Manager in "Allowed IP List" using the procedure in "11.2.3.1 Setup Network Environment" (page 745).
- Before enabling the SNMP function, use the procedure in "11.2.3.2 Setup Firewall" (page 758) to allow the "SNMP" connection for the setting target LAN port.

Note

- By using the procedure in "Chapter 3 Initial Setup" (page 38), the SNMP Agent environment can be configured with the wizard. When the [Initial Setup] function is not used, configure the SNMP Agent environment in the following order:
  - When using SNMPv1 or SNMPv2c for SNMP communication

    (1) Setup SNMP Agent Basic Interface

    (2) Setup SNMP Manager

    (3) Setup SNMP Agent MIB Access View

    (4) Setup SNMP Agent Community

    (5) Setup SNMP Agent Trap
  - When using SNMPv3 for SNMP communication

    (1) Setup SNMP Agent Basic Interface

    (2) Setup SNMP Manager

    (3) Setup SNMP Agent MIB Access View

    (4) Setup SNMP Agent User

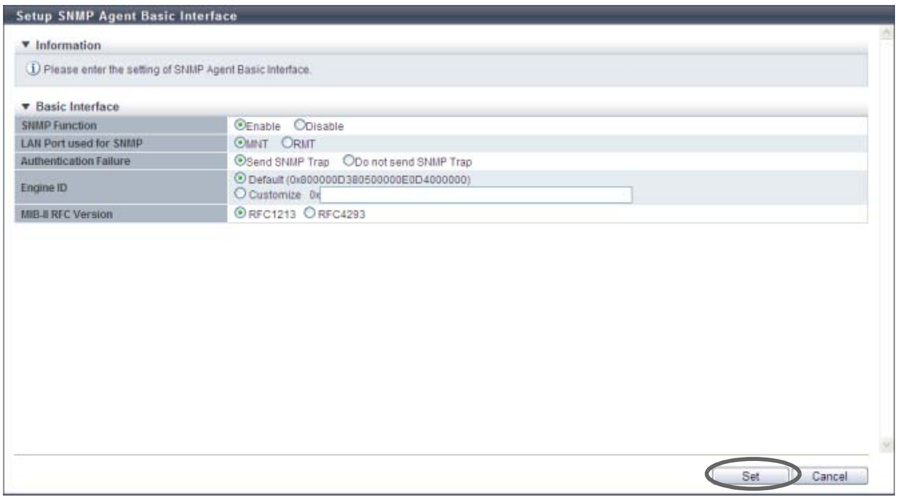
    (5) Setup SNMP Agent Trap
- The parameter settings specified using this function remain even when the "SNMP Function" setting is changed from "Enable" to "Disable".

The procedure to set the basic information of SNMP Agent is as follows:

Procedure

1. Click [Setup SNMP Interface] in [Action].
2. Specify the parameters, and click the [Set] button.
   - SNMP Function
     Select whether to enable or disable the SNMP function.

- LAN Port used for SNMP
  When enabling the SNMP function, select the port used for SNMP from "MNT" or "RMT".
  When sending a SNMPv1 trap, the agent-address of the trap sender is the Master CM IP address of the selected port.
- Authentication Failure
  When enabling the SNMP function, select "Send SNMP Trap" or "Do not send SNMP Trap" when authentication fails.
- Engine ID
  When enabling the SNMP function, enter the engine ID of the SNMP.
  The engine ID is a unique identifier used to distinguish the connection target storage system between the SNMP Manager and the SNMP Agent.
  It is not necessary to change the default setting for normal use. The default engine ID of the ETERNUS DX Disk storage system is as follows:
    Octet 1 - 4: Bitwise OR between the company code (fujitsu=211) and 0x80000000
    Octet 5: 0x80 (fixed)
    Octet 6 - 13: WWN of the ETERNUS DX Disk storage system (8 bytes)
  The following input conditions apply:
  - Alphanumeric characters (0 - 9, A - F, a - f)
  - Inputting only "0" or "F" for the "Engine ID" field is not allowed
  - 10 - 64 characters (even number)
- MIB-II RFC Version
  When enabling the SNMP function, select either "RFC1213" or "RFC4293" as the MIB-II support RFC version.
  Although it is not necessary to change the default setting ("RFC1213") for normal use, select the RFC version that is supported by the SNMP manager.
  - RFC1213
    This mode is used for MIB-II that supports RFC1213.
    This RFC supports IPv4 addresses.
  - RFC4293
    This mode is used for MIB-II that supports RFC4293.
    This RFC supports IPv4 addresses and IPv6 addresses. This RFC is an extended definition for RFC1213.

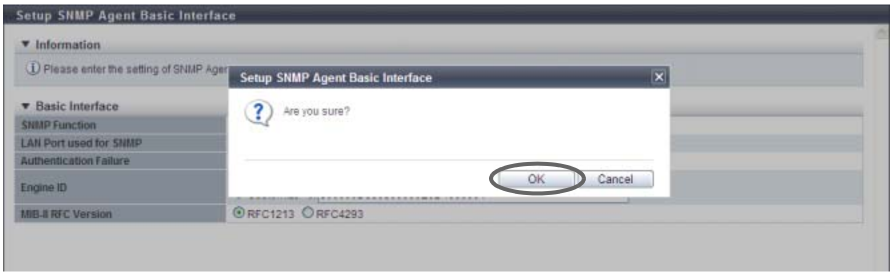


→ A confirmation screen appears.

Caution

If the entered engine ID does not satisfy the input conditions, an error screen appears.

3 Click the [OK] button.



→ Setting of the SNMP Agent basic interface starts.

4 Click the [Done] button to return to the [Network] screen.

End of procedure

11.2.3.4 Setup SNMP Manager

This function specifies the IP address of the SNMP Manager.
The SNMP Manager is used when accessing the ETERNUS DX Disk storage system using the community name or the user name, or when sending a trap from the ETERNUS DX Disk storage system to the SNMP Manager.
Up to ten SNMP Managers can be specified for each ETERNUS DX Disk storage system.

Caution

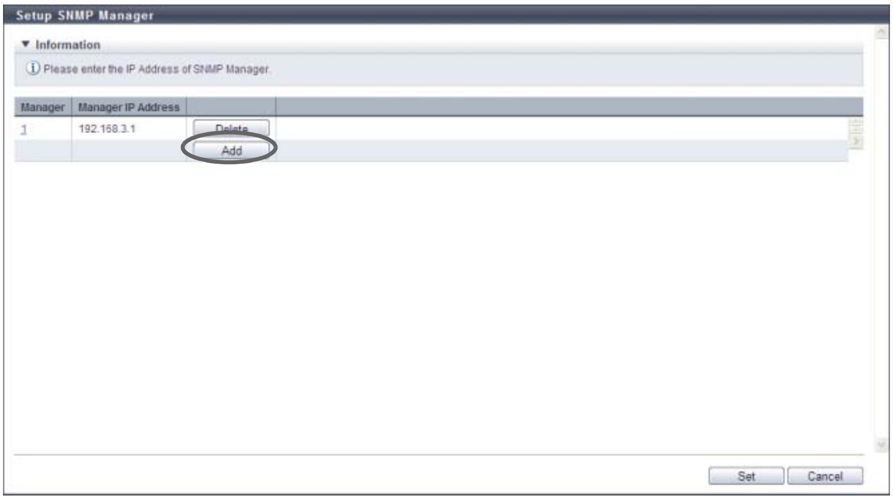
- If the "SNMP Function" is disabled, this function cannot be used.
- The IP address of the SNMP Manager that is used in the settings in "11.2.3.7 Setup SNMP Agent Community" (page 771) or "11.2.3.8 Setup SNMP Agent Trap" (page 774) cannot be changed or deleted.
- When SNMP Manager exists in a different subnetwork from where the ETERNUS DX Disk storage system belongs, specify the IP address or the network address of SNMP Manager in the "Allowed IP List" using the procedure in "11.2.3.1 Setup Network Environment" (page 745).

The procedure to set the SNMP Manager is as follows:

Procedure

1 Click [Setup SNMP Manager] in [Action].

2 Click the [Add] button.



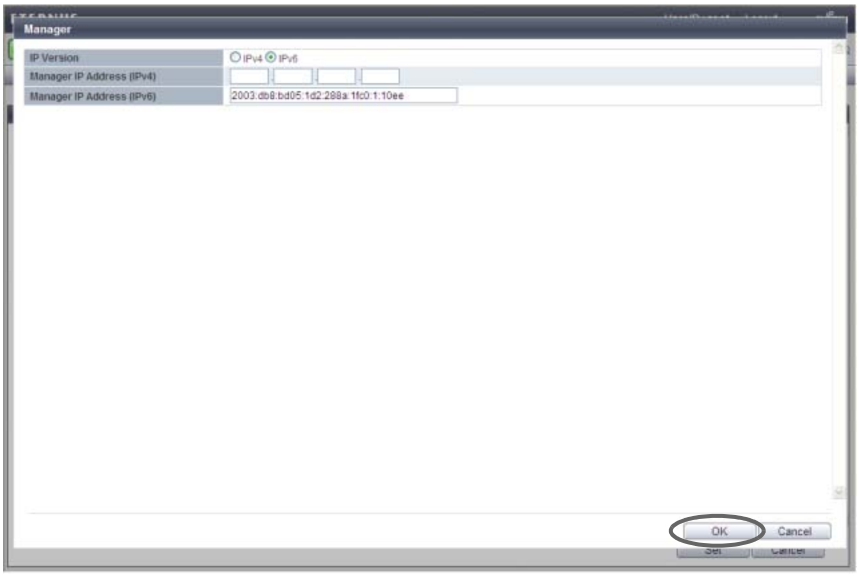
→ The [Manager] screen appears.

Note

- Click the [Manager] link to edit the existing IP address for the target SNMP manager area.
- Click the [Delete] button to delete the existing IP address for the target SNMP Manager area.

3 Input or edit the IP address, and click the [OK] button.

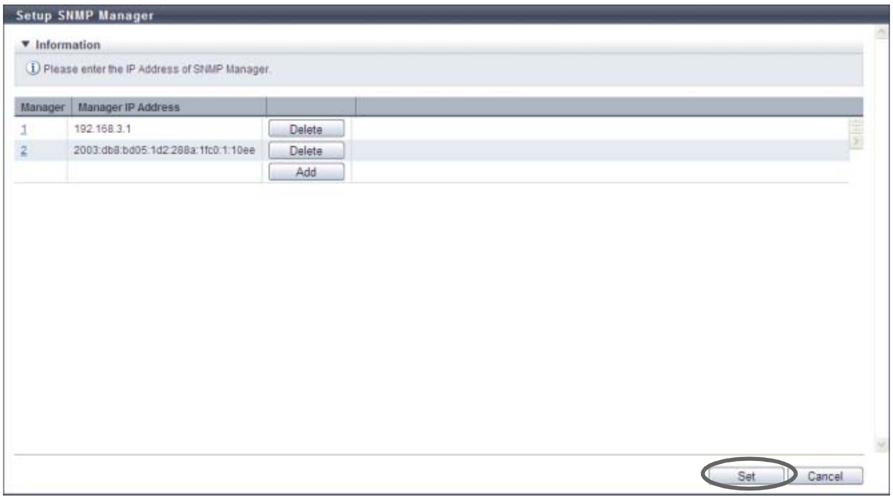
- IP Version
  Select "IPv4" or "IPv6" for the IP version of the SNMP Manager IP address.
- Manager IP Address (IPv4)
  Input the IP address of the SNMP Manager with the IPv4 format.
  The IP address which has already been used cannot be entered.
  This setting is enabled when "IPv4" is selected for "IP Version".
  The following input condition applies:
  - xxx.xxx.xxx.xxx
    - First text box: "1" - "255"
    - Other text boxes: "0" - "255"
- Manager IP Address (IPv6)
  Input the IP address of the SNMP Manager with the IPv6 format. The following IPv6 addresses can be used; "link local address", "global address", "unique local address", and "6to4 address". Refer to "Available IPv6 Address" (page 757) for details. The IP address which has already been used cannot be entered.
  This setting is enabled when "IPv6" is selected for "IP Version".
  The following input condition applies:
  - xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
    Refer to "IPv6 Address Notation" (page 378) for details.



→ Returns to the original screen.

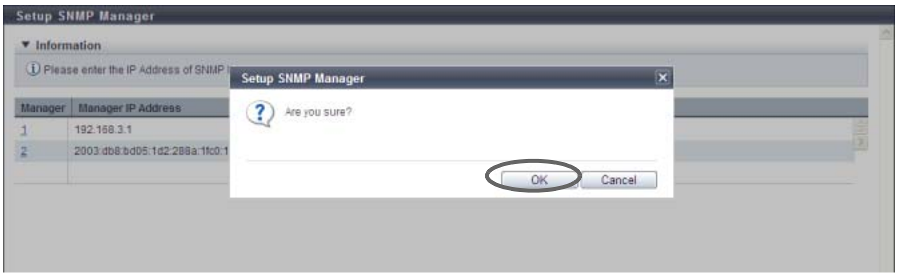
4 Repeat Step 2 and Step 3 to configure multiple IP addresses.

5 After adding or editing the IP address, click the [Set] button.



→ A confirmation screen appears.

6 Click the [OK] button.



→ Setting of the SNMP Manager starts.

7 Click the [Done] button to return to the [Network] screen.

End of procedure

11.2.3.5 Setup SNMP Agent MIB Access View

This function sets up the SNMP Agent MIB View.
MIB View is used for defining the accessible area in the Management Information Base (MIB) database, with a tree type structure. Use this item when defining the accessible area in the MIB database.
Up to ten MIB Views, including the default view, can be created for each ETERNUS DX Disk storage system.
There are three types of default views: "ViewALL", "View-mib2", and "View-exmib".

Caution

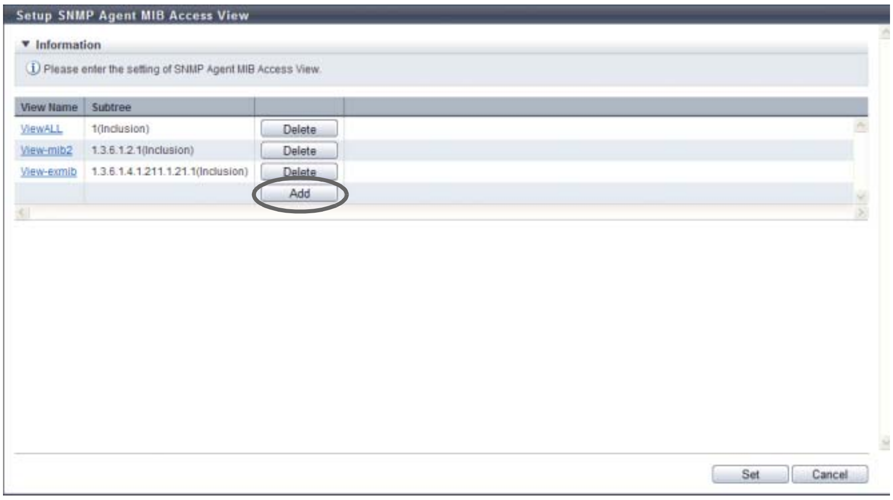
- If the "SNMP Function" is disabled, the [Setup SNMP Manager] function cannot be used.
- The view name that is used in the settings in "11.2.3.6 Setup SNMP Agent User" (page 768) or "11.2.3.6 Setup SNMP Agent User" (page 768) cannot be changed or deleted. However, note that the MIB View (Subtree) can be changed.
- The default view can be changed or deleted.

The procedure to change the SNMP Agent MIB view is as follows:

Procedure

1 Click [Setup SNMP MIB View] in [Action].

2 Click the [Add] button.



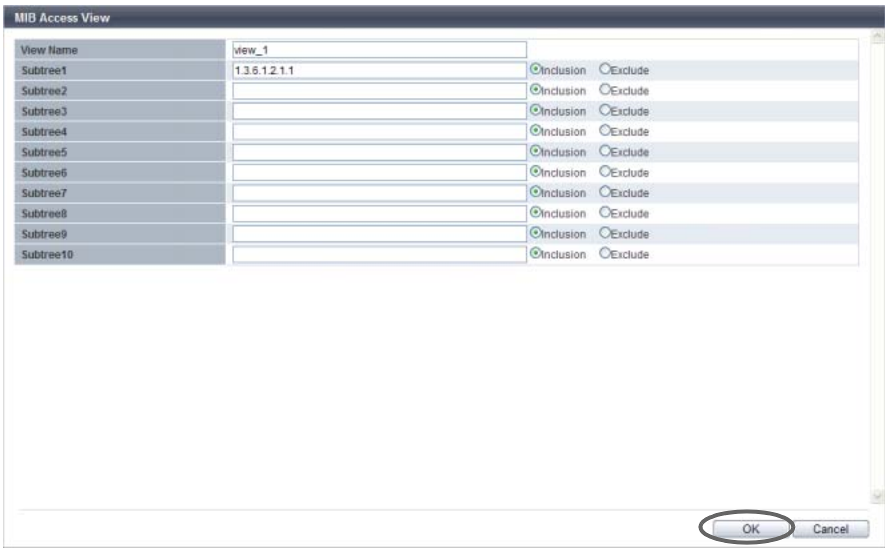
Note

Click the [View Name] link to edit the existing MIB View.

3 Input or edit the MIB View, and click the [OK] button.

- View Name
  Input the MIB View name.
  The view name which has already been used cannot be entered.
  The following input conditions apply:
  - Up to 32 alphanumeric characters and symbols
  - "! (exclamation mark)", "# (hash mark)", "& (ampersand)", "_ (underscore)", "+ (plus)", "- (hyphen)", "* (asterisk)" and "/ (slash)" can be used
  - Spaces
- Subtree1 - Subtree10
  Specify the MIB access range of the corresponding view in the subtree. Input the subtree in the Object ID format (*1).
  Select whether to include as or exclude from each subtree as the MIB access range.
  One or more subtrees are required per view.
  The same subtree cannot be specified multiple times in a single view. However, the same subtree can be configured to different views.
  The following input conditions apply:
  - Up to 251 alphabetic characters and numeric characters ("1" - "65535")
  - Spaces

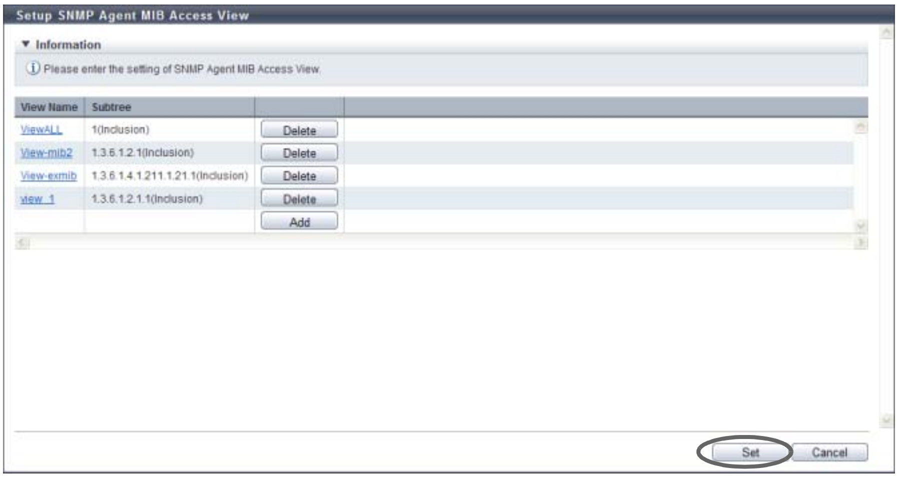
*1: The "Object ID" is indicated by using "." (periods) in a format such as "1.3.6.1.2.1.1". The setting range of each value that is separated using "." (periods) is 1 - 65535. A total of up to 251 characters can be entered (including periods). The following values cannot be entered in the ETERNUS DX Disk storage system:
(1) Values starting with a period: ".1.3.6.1.2.1.1"
(2) Value ending with a period: "1.3. 6.1.2.1.1."
(3) Values with two consecutive periods: "1. . 3. 6. 1. 2. 1. 1"
(4) Values including "0": "1.3.6.1.2.0.1"



→ Returns to the original screen.

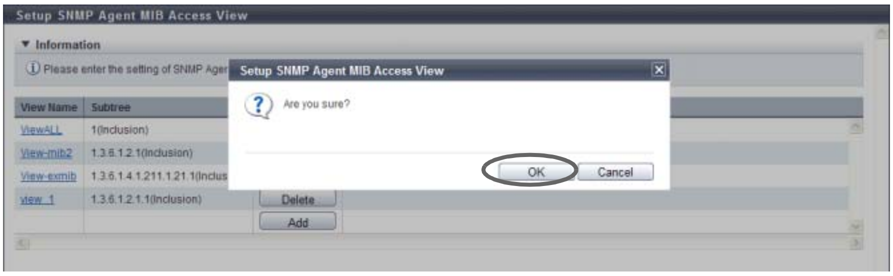
4 Repeat Step 11.2 and Step 3 to configure multiple MIB Views.

5 After adding or editing the MIB View, click the [Set] button.



→ A confirmation screen appears.

6 Click the [OK] button.



→ Setting of the SNMP Agent MIB View starts.

7 Click the [Done] button to return to the [Network] screen.

End of procedure

11.2.3.6 Setup SNMP Agent User

This function sets up the user which accesses the SNMP Agent.
The security level and the MIB access range are configured for each user.
Up to ten users can be specified for each ETERNUS DX Disk storage system.

Caution

- If the "SNMP Function" is disabled, the [Setup SNMP Manager] function cannot be used.
- The user name that is used in the settings in "11.2.3.8 Setup SNMP Agent Trap" (page 774) cannot be changed or deleted. However, note that some of the user information (MIB View Setting, Authentication, and Encryption) can be changed.

Note

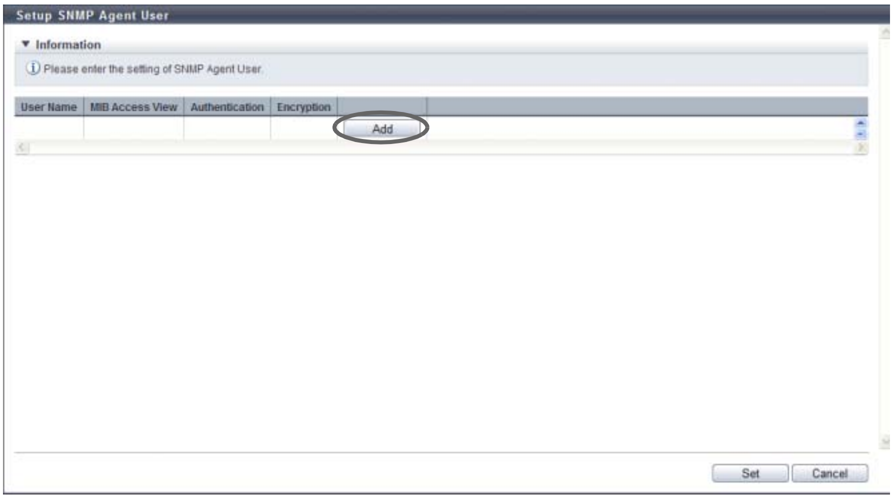
The authentication and encryption can be enabled/disabled, and also the MIB access range can be specified, for each user.

The procedure to set the user to access the SNMP Agent is as follows:

Procedure

1 Click [Setup SNMP User] in [Action].

2 Click the [Add] button.



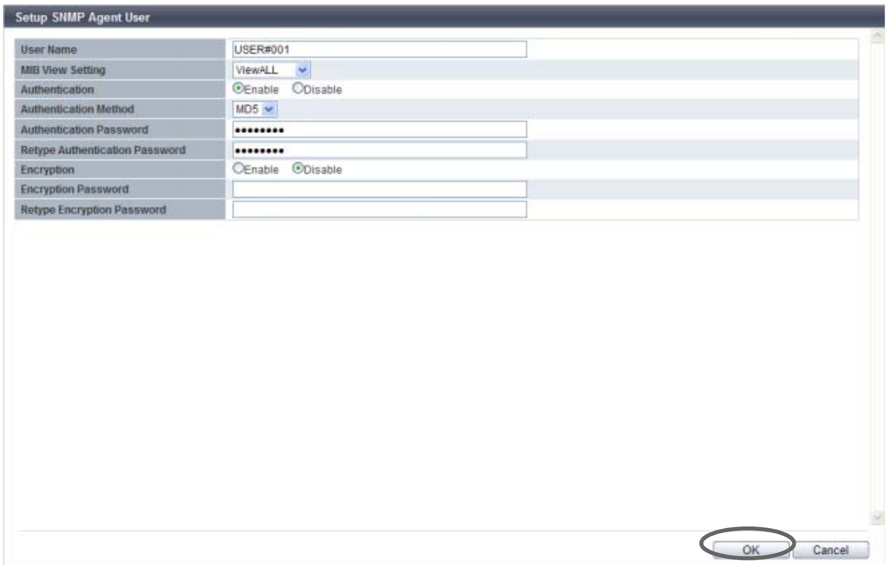
Note

Click the [User Name] link to edit the existing user.

3 Input or edit the user information, and click the [OK] button.

- User Name
  Input the user name which accesses the SNMP Agent.
  The user name which has already been used cannot be entered.
  The following input conditions apply:
  - 8 - 32 alphanumeric characters and symbols
  - "! (exclamation mark)", "# (hash mark)", "& (ampersand)", "_ (underscore)", "+ (plus)", "- (hyphen)", "* (asterisk)" and "/ (slash)" can be used
  - Spaces
- MIB View Setting
  Select the view name to specify the MIB access range for the user.
  A "blank" means accessing the MIB is not allowed.
- Authentication
  Select whether to enable or disable the authentication.
- Authentication Method
  When enabling authentication, select the authentication method from "MD5" (Message Digest 5) or "SHA" (Secure Hash Algorithm).

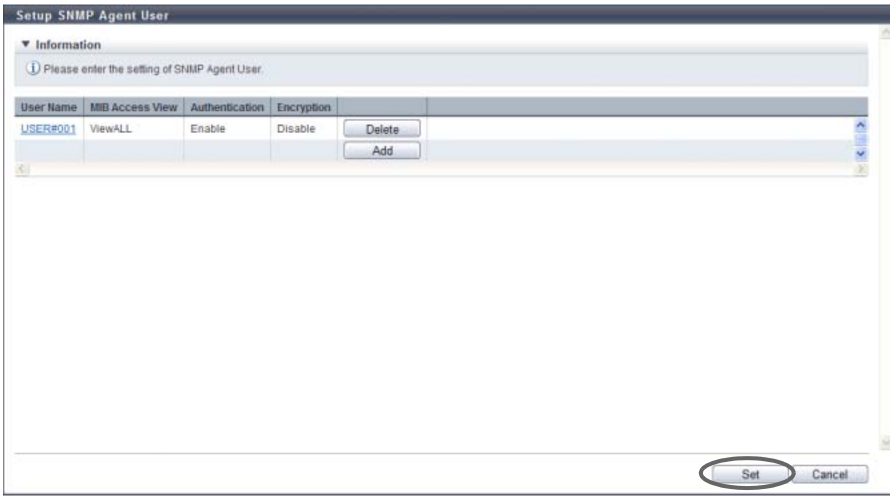
- Authentication Password
  When enabling authentication, enter the authentication password.
  The following input conditions apply:
  - 8 - 64 alphanumeric characters and symbols
  - "! (exclamation mark)", "# (hash mark)", "& (ampersand)", "_ (underscore)", "+ (plus)", "- (hyphen)", "* (asterisk)" and "/ (slash)" can be used
  - Spaces
- Retype Authentication Password
  When enabling authentication, enter the authentication password again.
- Encryption
  Select whether to enable or disable the encryption.
  If the "Authentication" setting is "Disable", the encryption setting cannot be selected.
- Encryption Password
  When enabling encryption, enter the encryption password.
  The following input conditions apply:
  - 8 - 64 alphanumeric characters and symbols
  - "! (exclamation mark)", "# (hash mark)", "& (ampersand)", "_ (underscore)", "+ (plus)", "- (hyphen)", "* (asterisk)" and "/ (slash)" can be used
  - Spaces
- Retype Encryption Password
  When enabling the encryption, enter the encryption password again.



→ Returns to the original screen.

4 Repeat Step 2 and Step 3 to configure multiple users.

5 After adding or editing the user information, click the [Set] button.



→ A confirmation screen appears.

6 Click the [OK] button.



→ Setting of the SNMP Agent user starts.

7 Click the [Done] button to return to the [Network] screen.

End of procedure

11.2.3.7 Setup SNMP Agent Community

This function sets up the SNMP Agent Community.
The Community is a range of available networks for SNMP.
The setting value is used as the password for SNMP Manager to access the SNMP Agent of the ETERNUS DX Disk storage system.
The SNMP Agent only accepts a request from SNMP Manager if the specified community names for SNMP Manager and SNMP Agent are the same.
Up to ten communities can be specified for each ETERNUS DX Disk storage system.

Caution

- If the "SNMP Function" is disabled, the [Setup SNMP Manager] function cannot be used.
- The community name that is used in the settings in "11.2.3.8 Setup SNMP Agent Trap" (page 774) cannot be changed or deleted.

Note

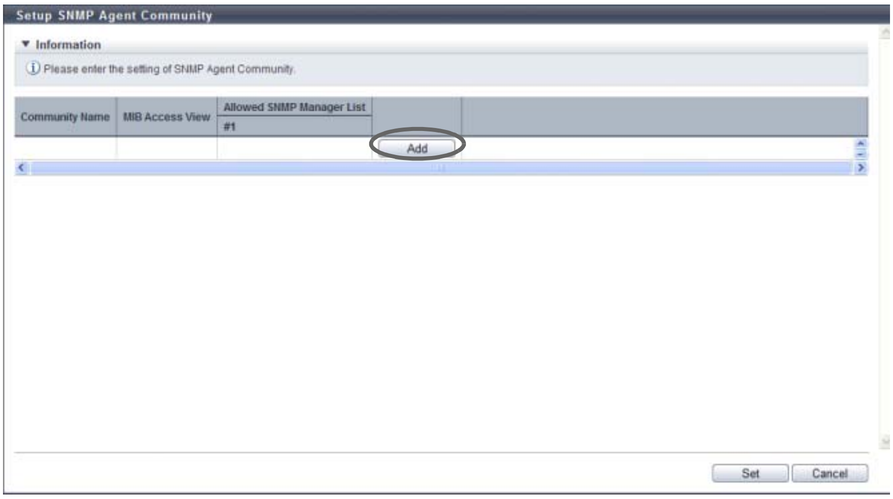
The SNMP Managers which are allowed to access, and the MIB access range, can be specified for each community.

The procedure to set the SNMP Agent community is as follows:

Procedure

1 Click [Setup SNMP Community] in [Action].

2 Click the [Add] button.



Note

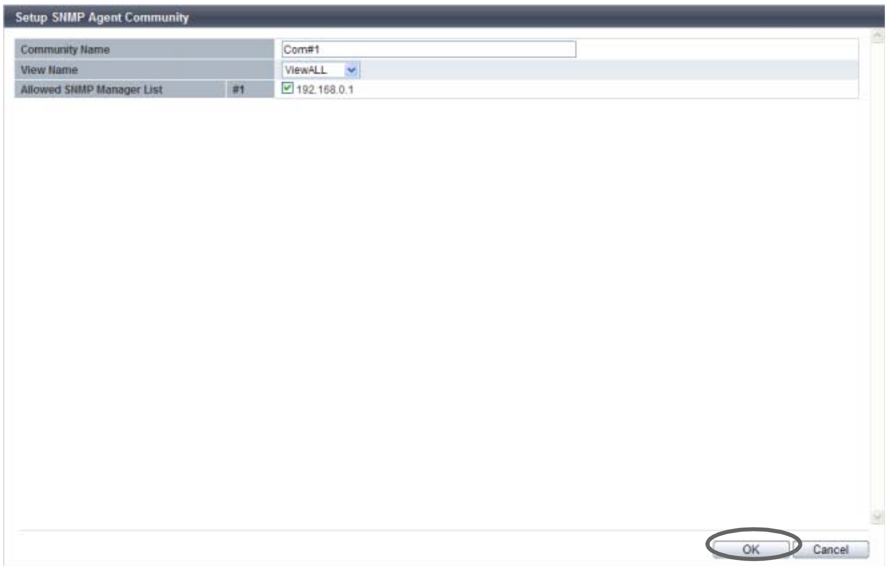
Click the [Community Name] link to edit the existing community information.

3 Input or edit the community, and click the [OK] button.

- Community Name
  Input the community name to be used when accessing a MIB or sending a trap.
  The community name which has already been used cannot be entered.
  The following input conditions apply:
  - Up to 32 alphanumeric characters and symbols
  - "! (exclamation mark)", "# (hash mark)", "& (ampersand)", "_ (underscore)", "+ (plus)", "- (hyphen)", "* (asterisk)" and "/ (slash)" can be used
  - Spaces
- View Name
  Select the view name to specify the MIB access range for the community.
  A "blank" means accessing the MIB is not allowed.

- Allowed SNMP Manager List
  Select the IP address of the SNMP Manager which is allowed to access in the community.
  Only the selected SNMP Manager is allowed to access.
  However, if the Allowed SNMP Manager List has been left blank, all of the SNMP Managers (*1) are allowed to access.

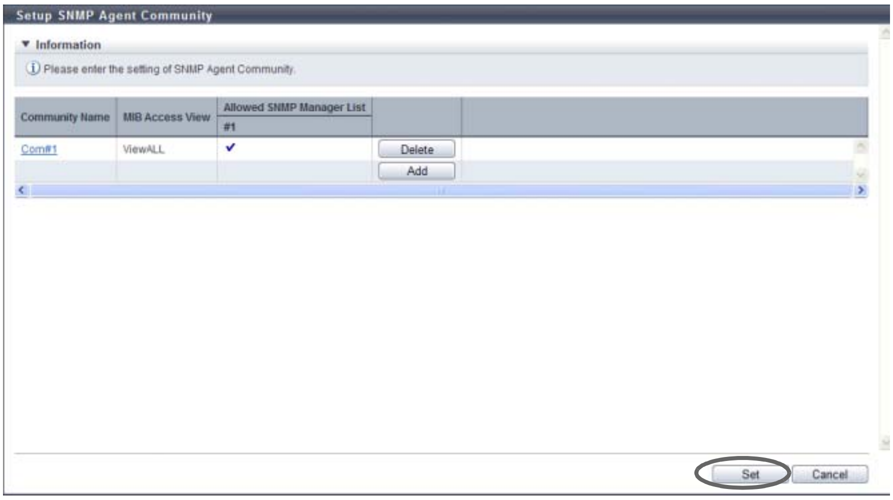
  *1: Not only the SNMP Manager which has been registered using the procedure in "11.2.3.4 Setup SNMP Manager" (page 763), but also the other SNMP Managers are allowed to access.



→ Returns to the original screen.

4 Repeat Step 2 and Step 3 to configure multiple communities.

5 After adding or editing the community, click the [Set] button.



→ A confirmation screen appears.

6 Click the [OK] button.



→ Setting of the SNMP Agent Community starts.

7 Click the [Done] button to return to the [Network] screen.

End of procedure

11.2.3.8 Setup SNMP Agent Trap

This function notifies events that occur in the ETERNUS DX Disk storage system to the SNMP Manager by an SNMP Trap.
This function configures the trap destination, the trap version, etc.
Up to ten traps can be specified for each ETERNUS DX Disk storage system.

Caution

- If the "SNMP Function" is disabled, the [Setup SNMP Manager] function cannot be used.
- When SNMP Manager exists in a different subnetwork from where the ETERNUS DX Disk storage system belongs, specify the IP address or the network address of SNMP Manager in the "Allowed IP List" using the procedure in "11.2.3.1 Setup Network Environment" (page 745).

The procedure to set the SNMP Agent trap is as follows:

Procedure

1 Click [Setup SNMP Trap] in [Action].

2 Click the [Add] button.

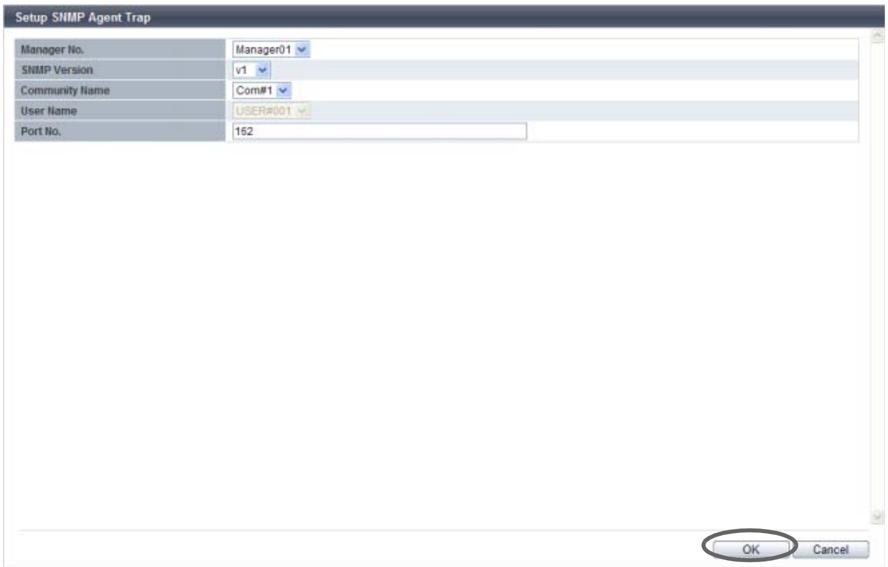


Note

Click the [Trap No.] link to edit the existing trap.

3 Add or edit the trap information, and click the [OK] button.

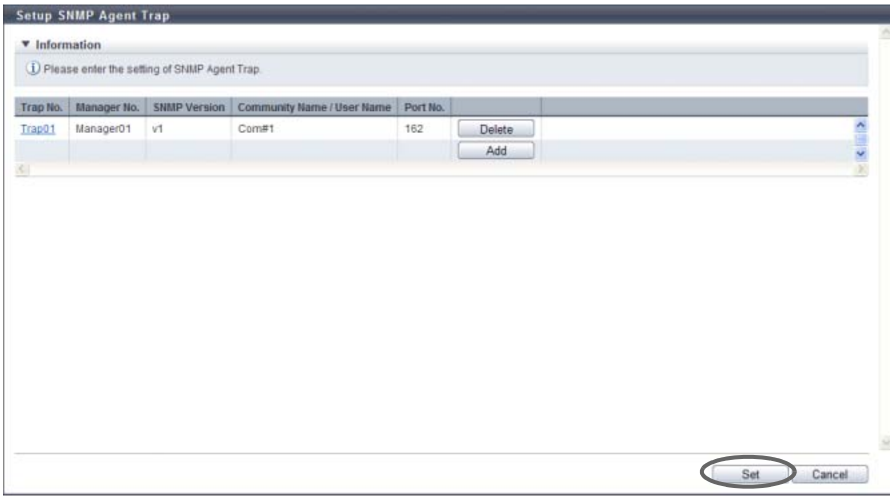
- Manager No.
  Select a manager number from "Manager01" to "Manager10".
  The management number of the SNMP Manager, which has been registered using the procedure in "11.2.3.4 Setup SNMP Manager" (page 763), is displayed as an option.
- SNMP Version
  Select the trap SNMP version from "v1", "v2c", or "c3".
- Community Name
  Select the community name used when sending a trap.
  The community name, which has been registered using the procedure in "11.2.3.7 Setup SNMP Agent Community" (page 771), is displayed as an option.
  If "v1" or "v2c" is selected as the "SNMP Version", the "Community Name" must be specified.
- User Name
  Select the user name used when sending a trap.
  The user name, which has been registered using the procedure in "11.2.3.6 Setup SNMP Agent User" (page 768), is displayed as an option.
  If "v3" has been selected as the "SNMP Version", the "User Name" must be specified.
- Port No.
  Input the port number of the trap destination between 1 - 65535.
  When changing a port number, enter a unique port number.



→ Returns to the original screen.

4 Repeat Step 2 and Step 3 to configure multiple traps.

5 After adding or editing the trap information, click the [Set] button.



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When "Manager No. " or "Community Name/User Name" is not input
- When a trap with the same parameters (except the "Trap No. ") exists
- When a trap with the same parameters (except the "Trap No. " and the "Port No. ") exists

6 Click the [OK] button.



→ Setting of the SNMP Agent Trap starts.

7 Click the [Done] button to return to the [Network] screen.

End of procedure

11.2.3.9 Download MIB File

This function downloads the MIB definition file in the ETERNUS DX Disk storage system.
MIB is the information for managing SNMP Agent that is transferred by using SNMP Manager with the SNMP.
The MIB definition file is used by the application which uses SNMP (SNMP Manager).

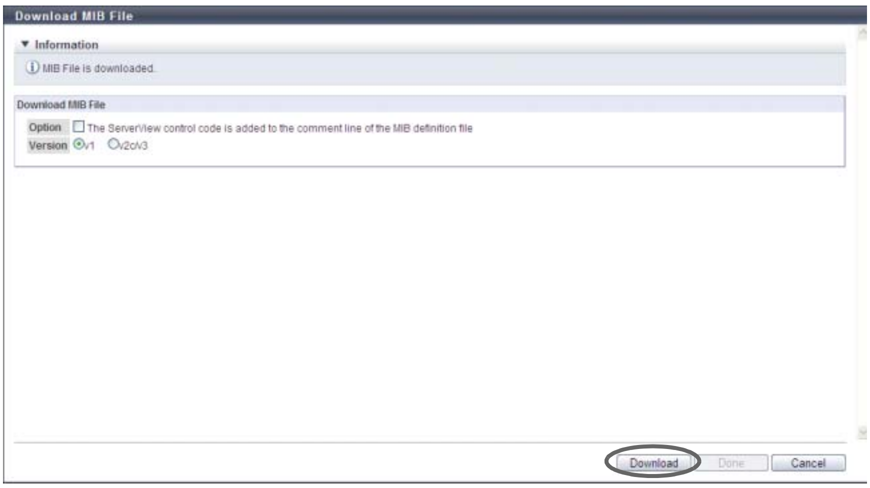
The procedure to download an MIB file as follows:

Procedure

1 Click [Download MIB File] in [Action].

2 Specify the parameters, and click the [Download] button.

- Option
  Select the "The ServerView control code is added to the comment line of the MIB definition file" checkbox when downloading the MIB file used for storage system monitoring by ServerView.
- Version
  Select the SNMP Trap version used for storage system monitoring from "v1", or "v2c/v3".



→ A confirmation screen appears.

3 Click the [OK] button.



→ A dialog box to download the file appears.

4 Save the downloaded file.

The file name is as follows:

- ETERNUS DX80 S2/DX90 S2: "FJDARY-E100.MIB"
- ETERNUS DX410 S2/DX440 S2: "FJDARY-E100.MIB"
- ETERNUS DX8100 S2: "FJDARY-E100.MIB"
- ETERNUS DX8700 S2: "FJDARY-E102.MIB"

→ The downloaded file is saved.

5 Click the [Done] button to return to the [Network] screen.

End of procedure

11.2.3.10 Send SNMP Trap Test

This function transmits the test trap from the SNMP Agent to the SNMP Manager.
The SNMP Trap is the event information reported by the ETERNUS DX Disk storage system (SNMP Agent).
Perform SNMP Agent and SNMP Manager settings before executing this test.

Caution

- Perform the following settings before executing this test. If the SNMP function is disabled, the trap test cannot be performed.
  - Setup Network Environment
  - Setup SNMP Agent Basic Interface
  - Setup SNMP Manager
  - Setup SNMP Agent MIB Access View
  - Setup SNMP Agent User
  - Setup SNMP Agent Community
  - Setup SNMP Agent Trap
- This function transmits a test trap.
- When SNMP Manager exists in a different subnetwork from where the ETERNUS DX Disk storage system belongs, specify the IP address or the network address of SNMP Manager in the "Allowed IP List" using the procedure in "11.2.3.1 Setup Network Environment" (page 745).

The procedure to perform the SNMP Trap test is as follows:

Procedure

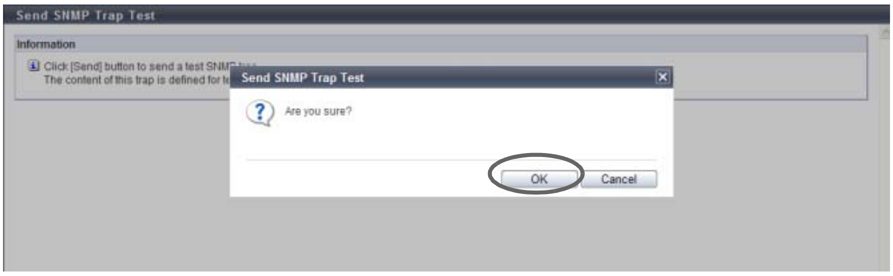
1 Click [Send SNMP Trap] in [Action].

2 Click the [Send] button.



→ A confirmation screen appears.

3 Click the [OK] button.



→ The SNMP Trap test is performed.

4 Click the [Done] button to return to the [Network] screen.

Caution

Confirm that the trap has been successfully received by SNMP Manager after the SNMP Trap test has been performed.

End of procedure

11.2.3.11 Display SMTP Log

This function displays the E-Mail communication log between the ETERNUS DX Disk storage system and the E-Mail server. If the E-Mail communication is not operated properly, this function may identify the cause of problem.
The E-Mail communication log contains requests from the ETERNUS DX Disk storage system to the server and responses from the server to the ETERNUS DX Disk storage system. Only the E-Mail communication log for the last executed event is displayed.

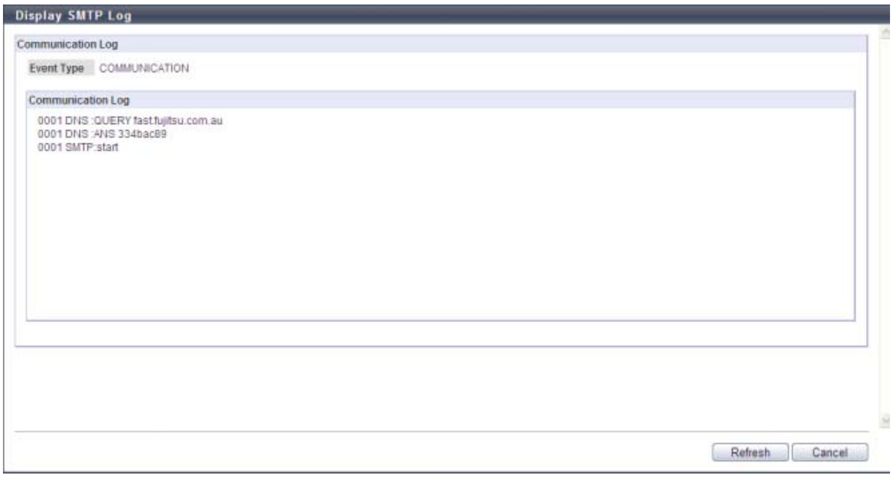
Caution

Server connection related settings for the server is required in advance. Refer to "11.2.3.12 Setup E-Mail Notification" (page 781) for details.

The procedure to display SMTP log is as follows:

Procedure

1. Click [Display SMTP Log] in [Action].
2. Check the displayed "Event Type" and the "Communication Log".



Note

Click the [Refresh] button to update to the latest screen.

3. Click the [Cancel] button to return to the [Network] screen.

End of procedure

11.2.3.12 Setup E-Mail Notification

This function is used to configure the E-mail Notification settings for the various events detected by the ETERNUS DX Disk storage system.
To specify event notification, refer to "11.2.9.1 Setup Event Notification" (page 880).

Caution

When stopping the event notification via E-Mail, perform one of the following procedures.

- Disable the "Notification E-Mail"
- Clear the E-Mail checkbox of the notification method using the procedure in "11.2.9.1 Setup Event Notification" (page 880).

The procedure to set a E-Mail notification is as follows:

Procedure

1. Click [Setup E-Mail Notification] in [Action].
2. Specify the parameters, and click the [Set] button.

● Notification E-Mail

- Notification E-Mail
  Select whether to enable ("Yes") or disable ("No") the E-Mail notification function.
- Destination E-Mail Address
  Specify the E-Mail destination address.
  At least one address must be specified. Up to five addresses can be specified.
  The following input condition applies:
  - Up to 63 alphanumeric characters and symbols (except spaces)
- Comment
  Input the message (comment) to be added to the E-Mail. The comment can be omitted.
  The following input conditions apply:
  - Up to 225 characters
  - Within ten lines
  - Alphanumeric characters, symbols, and spaces

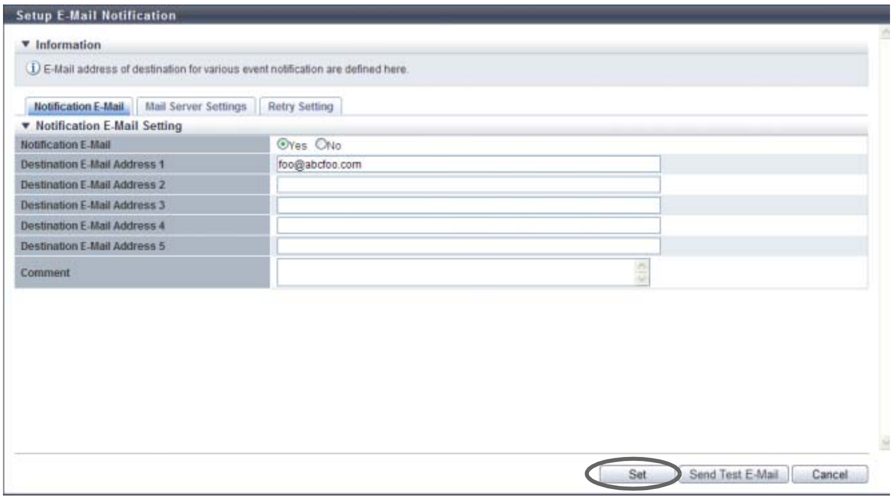
● Mail Server Settings

- LAN Port used for SMTP Connection
  Select the LAN port connecting to the SMTP server from "MNT" or "RMT".
- Sender E-Mail Address
  Input the E-Mail address of the ETERNUS DX Disk storage system.
  The following input condition applies:
  - Up to 63 alphanumeric characters and symbols (except spaces)

- SMTP Server
  Specify the IP address or domain name of the SMTP server to be used.
  There are two methods to specify an IP address; "IPv4" and "IPv6". The following IPv6 addresses can be used; "link local address", "global address", "unique local address", and "6to4 address". Refer to "Available IPv6 Address" (page 757) for details.
  When the current setting is displayed, the IPv6 address is displayed as an abbreviation.
  The following input condition applies:
  - For IPv4 address
    - xxx.xxx.xxx.xxx
      xxx: 1 - 255 for the top field (decimal)
      xxx: 0 - 255 for other fields (decimal)
  - For IPv6 address
    - xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
      xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
      Refer to "IPv6 Address Notation" (page 378) for details.
  - For "Domain Name"
    - Up to 63 alphanumeric characters and symbols
- SNMP Port No.
  Specify the port number used by the SMTP server between 1 - 65535.
- SMTP requires authentication
  Select the user authorization method to connect to the SMTP server from "None" or "AUTH SMTP".
- User Name
  If "AUTH SMTP" is selected for "SMTP Authentication Information", specify the sender user name.
  The following input condition applies:
  - Up to 32 alphanumeric characters and symbols
- Password
  When "AUTH SMTP" is selected for "SMTP Authentication Information", specify the sender password.
  The following input condition applies:
  - Up to 64 alphanumeric characters and symbols
- Authentication Method
  If "AUTH SMTP" is selected for "SMTP Authentication Information", select the authentication method from "Automatic", "CRAM-MD5", "PLAIN", or "LOGIN".

Retry Setting

- Maximum Retries
  Specify the maximum number of retries ("0" or "1").
- Retry Interval
  Specify the interval between retries ("1" to "5") in units of seconds.



→ A confirmation screen appears.

3 Click the [OK] button.



→ The specified E-mail notification setting is performed.

4 Click the [Done] button to return to the [Network] screen.

Note

Click the [Send Test E-Mail] button to confirm that an E-Mail can be sent to the specified address. When sending a test E-Mail, select "Enable" for the "Notification E-Mail" setting. Note that clicking [Set] button is required when changing the parameters before sending a test E-Mail to enable the new settings.

End of procedure

11.2.3.13 Setup Syslog

This function sets up external servers (Syslog server) for sending logs of events that are detected by the ETERNUS DX Disk storage system.
Up to two Syslog servers can be registered.

The following events are sent as Syslogs:

- All the notification target events that are configured using the procedure in "11.2.9.1 Setup Event Notification" (page 880)
- Logins and logouts from GUI and CLI

Caution

- Select whether to send ("on") or not send ("off") Syslogs for each ETERNUS DX Disk storage system.
- Confirm that the Syslog has been successfully sent to the Syslog server by logging in and out from GUI or CLI and performing a transmission test to the Syslog server.
- Even if a communication error occurs between the ETERNUS DX Disk storage system and the Syslog server, the Syslog is not sent again.

Note

- Use the procedure in "11.2.9.1 Setup Event Notification" (page 880) for specifying events to be notified as a Syslog.
- Syslogs are sent to both Syslog servers at the same time.
- The parameter settings for Syslog remain even when the "Send Log" setting is changed to "off".

The procedure to set up the Syslog is as follows:

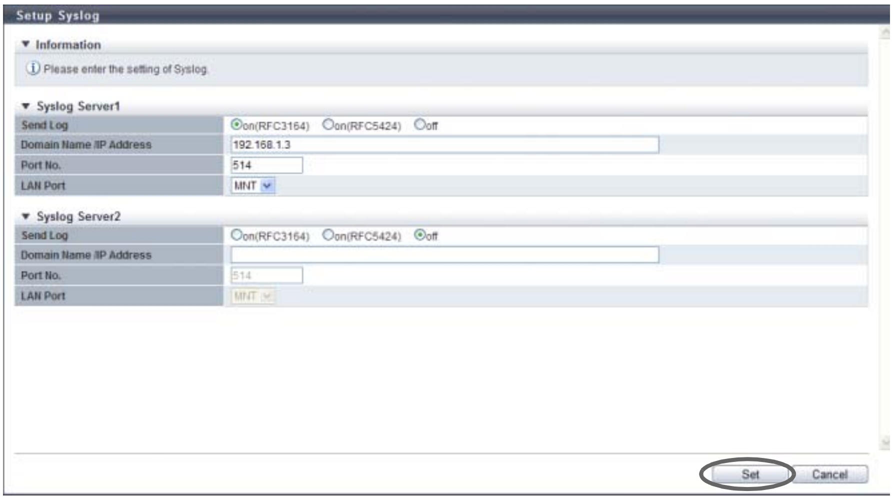
Procedure

1 Click [Setup Syslog] in [Action].

2 Specify the parameters, and click the [Set] button.

- Send Log
  Select from "on (RFC3164)", "on (RFC5424)", or "off" for Syslog sending.
  Logs are send in the selected RFC message format.
- Domain Name / IP Address
  Input the domain name or the IP address of the Syslog server.
  There are two methods to specify an IP address; "IPv4" and "IPv6". The following IPv6 addresses can be used; "link local address", "global address", "unique local address", and "6to4 address". Refer to "Available IPv6 Address" (page 757) for details.
  When the current setting is displayed, the IPv6 address is displayed as an abbreviation.
  The following input conditions apply:
  - For "Domain Name"
    Up to 63 alphanumeric characters and symbols
  - For IPv4 address
    xxx.xxx.xxx.xxx
    xxx: 1 - 255 for the top field (decimal)
    xxx: 0 - 255 for other fields (decimal)
  - For IPv6 address
    xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
    Refer to "IPv6 Address Notation" (page 378) for details.
- Port No.
  Input the port number used to send a Syslog.
  The following input conditions apply:
  - Numeric characters
  - "1" - "65535"

- LAN Port
  Select the LAN port from "MNT" or "RMT" that is to be used to send a Syslog.



→ A confirmation screen appears.

Note

Up to two Syslog servers can be configured. When configuring a second Syslog server, specify the required parameters in "Syslog Server2".

3 Click the [OK] button.



→ Setting of the Syslog starts.

Caution

An error screen appears if the specified IP address of the Syslog server conflicts with the internal IP address of the ETERNUS DX Disk storage system.

4 Click the [Done] button to return to the [Network] screen.

End of procedure

11.2.3.14 Setup SSH Server Key

This function sets up the SSH server key that is used when encrypting communication using Secure SHell (SSH).
SSH is used when accessing from CLI.

Caution

After the SSH server key setting has been changed, the information must be updated in the storage system before accessing from CLI via the SSH connection. Log out from CLI and wait a few minutes before logging in again.

Note

- The SSH server key is specified in the factory settings (Key Length: 2048 bits).
- Even if the SSH server key setting has been changed, the setting PC, which has logged into CLI via the Telnet connection, will not be affected.

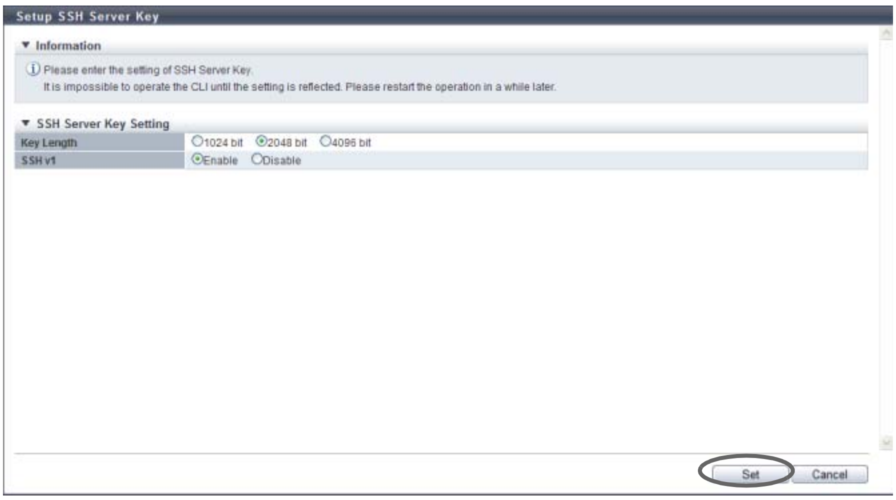
The procedure to set SSH server key is as follows:

Procedure

1 Click [Setup SSH Server Key] in [Action].

2 Specify the parameters, and click the [Set] button.

- Key Length
  Select the SSH server key length from "1024 bit", "2048 bit", and "4096 bit".
  The SSH server key length is equivalent to the encryption level. In general, the longer the key is, the higher the encryption level becomes (difficult to decrypt the encrypted data).
- SSH v1
  Select whether to enable or disable the SSH Version 1 connection.
  If the SSH Version 1 connection is disabled, only an SSH Version 2 connection is allowed.



→ A confirmation screen appears.

3 Click the [OK] button.



→ Setting of the SSH server key starts.

4 Click the [Done] button to return to the [Network] screen.

> **Caution**
>
> After setting the SSH server key, the information must be updated in the ETERNUS DX Disk storage system before being accessed from CLI via the SSH connection. Log out from CLI and wait a few minutes before logging in again.

End of procedure

11.2.3.15 Create Self-signed SSL Certificate

This function performs settings for creating the SSL server key and the self-signed SSL certificate to be used when encrypting communication using Secure Socket Layer (SSL).
SSL is used when accessing from GUI via the HTTPS connection.

> **Caution**
>
> - The HTTPS connection from GUI is disabled in the factory settings.
> - There are two types of SSL certificate formats: the "self-signed SSL certificate" and the "SSL server certificate". The "self-signed SSL certificate" is created by using this function and the "SSL server certificate" is created by using the procedure in "11.2.3.16 Create Key/CSR" (page 790). Register one of the certificates in the ETERNUS DX Disk storage system when using the HTTPS connection.
> - After the SSL server key and the self-signed SSL certificate have been created, the information must be updated in the storage system before accessing from GUI via the HTTPS connection. Log out from GUI and wait a few minutes before logging in again.
> - The self-signed SSL certificate must be registered on the browser in the setting PC. Until the registration has been completed, a warning message is displayed when accessing from GUI via the HTTPS connection.
> - Refer to "Appendix C Installing the Security Certificate" (page 981) for procedure to install the self-signed SSL certificate.
> - When using the key server for SED authentication key management , a self-signed SSL certificate or an SSL server certificate is required to establish the communication between the ETERNUS DX Disk storage system and the key server. These certificates are used as trusted SSL certificates of the ETERNUS DX Disk storage system. When using the key management server linkage function, create the self-signed SSL certificate for the ETERNUS DX Disk storage system. The created self-signed SSL certificate is transferred to the key server from the ETERNUS DX Disk storage system when the key is updated. Refer to "11.2.6.9 Update SED Authentication Key" (page 849) for details.

The procedures to create SSL server key and the self-signed SSL certificate are as follows:

Procedure

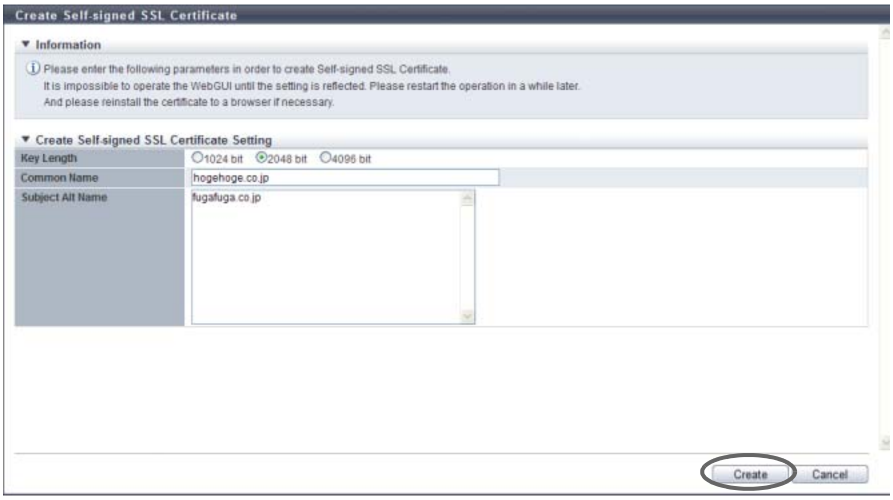
1 Click [Create SSL Certificate] in [Action].

2 Specify the parameters, and click the [Create] button.

- Key Length
  Select the SSL server key length from "1024 bit", "2048 bit", and "4096 bit".
  The SSL server key length is equivalent to the encryption level. In general, the longer the key is, the higher the encryption level becomes (difficult to decrypt the encrypted data).
- Common Name
  Specify Main IP Address or Fully Qualified Domain Name (FQDN) for ports (MNT and RMT) which are used to access from GUI via HTTPS connection (required).
  There are two methods to specify the main IP address; "IPv4" and "IPv6". The following IPv6 addresses can be used; "link local address", "global address", "unique local address", and "6to4 address". Refer to "Available IPv6 Address" (page 757) for details. When the current setting is displayed, the IPv6 address is displayed as an abbreviation.
  The following input conditions apply:
  - Main IP Address
    - For IPv4 address
      - xxx.xxx.xxx.xxx
        xxx: 1 - 255 for the top field (decimal)
        xxx: 0 - 255 for other fields (decimal)
      - Class must be A, B, or C.
    - For IPv6 address
      - xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
        xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
        Refer to "IPv6 Address Notation" (page 378) for details.
  - Fully Qualified Domain Name (FQDN)
    - Alphanumeric characters (A - Z, 0 - 9)
    - Symbols (except "<", ">", "?", "!", "@", "#", "$", "%", "?", "\", "?", "&", and space)
    - Up to 63 characters
- Subject Alt Name
  Specify Main IP Address or FQDN for ports (MNT and RMT) which are used to access from GUI via HTTPS connection.
  There are two methods to specify the main IP address; "IPv4" and "IPv6". The following IPv6 addresses can be used; "link local address", "global address", "unique local address", and "6to4 address". Refer to "Available IPv6 Address" (page 757) for details. When the current setting is displayed, the IPv6 address is displayed as an abbreviation.
  - Main IP Address
    The following input conditions apply:
    - For IPv4 address
      - xxx.xxx.xxx.xxx
        xxx: 1 - 255 for the top field (decimal)
        xxx: 0 - 255 for other fields (decimal)
      - Class must be A, B, or C.

- For IPv6 address
  - xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
    Refer to "IPv6 Address Notation" (page 378) for details.
- Fully Qualified Domain Name (FQDN)
  The following input conditions apply:
  - Alphanumeric characters
  - Symbols (except "<", ">", "?", "!", "@", "#", "$", "%", "?", "\", "?", "&", and space)
  - Up to 511 characters (A linefeed code is also counted as one character.)

Multiple IP addresses and FQDNs can be specified. Start a new line for each IP address or FQDN when specifying multiple IP addresses and FQDNs.
If IPv4 addresses, IPv6 addresses, and FQDNs are specified together, up to 511 characters can be specified, including symbols (":" (colon), "." (period), and linefeed code).



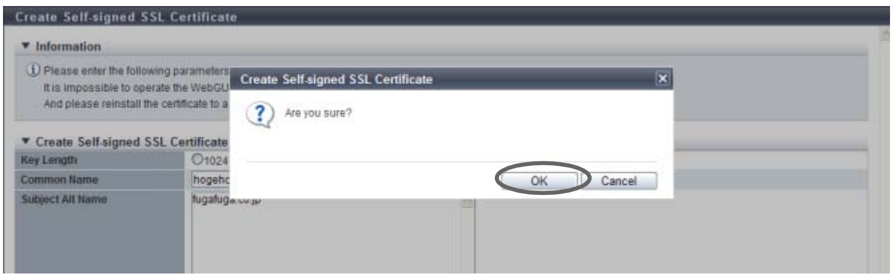
→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When items do not satisfy the input conditions
- When all of the required items are not input

3 Click the [OK] button.



→ Creation of the self-signed SSL certificate starts.

4 Click the [Done] button to return to the [Network] screen.

Caution

After registering the SSL server key or SSL server certificate, the information must be updated in the ETERNUS DX Disk storage system before being accessed from GUI via the HTTPS connection. Log out from GUI and wait a few minutes before logging in again.

End of procedure

11.2.3.16 Create Key/CSR

This function performs settings for creating and exporting the SSL server key and the Certificate Signing Request (CSR) which are used to acquire a SSL server certificate.
CSR is a certificate application form to submit to the certification authority.

Caution

- Check the necessary items for authentication beforehand.
- When using the key server for SED authentication key management , a self-signed SSL certificate or an SSL server certificate is required to establish the communication between the ETERNUS DX Disk storage system and the key server. These certificates are used as trusted SSL certificates of the ETERNUS DX Disk storage system. When using the key management server linkage function, register the SSL server certificate for the ETERNUS DX Disk storage system. The registered SSL server certificate is transferred to the key server from the ETERNUS DX Disk storage system when the key is updated. Refer to "11.2.6.9 Update SED Authentication Key" (page 849) for details.

Note

Refer to "11.2.3.17 Register SSL Certificate" (page 795) for detailed procedure to register the SSL server key and SSL server certificate.

The procedure to create a CSR is as follows:

Procedure

1 Click [Create Key/CSR] in [Action].

2 Specify the parameters, and click the [Create] button.

- Key Length
  Select the SSL server key length from "1024 bit", "2048 bit", and "4096 bit".
  The SSL server key length is equivalent to the encryption level. In general, the longer the key is, the higher the encryption level becomes (difficult to decrypt the encrypted data).

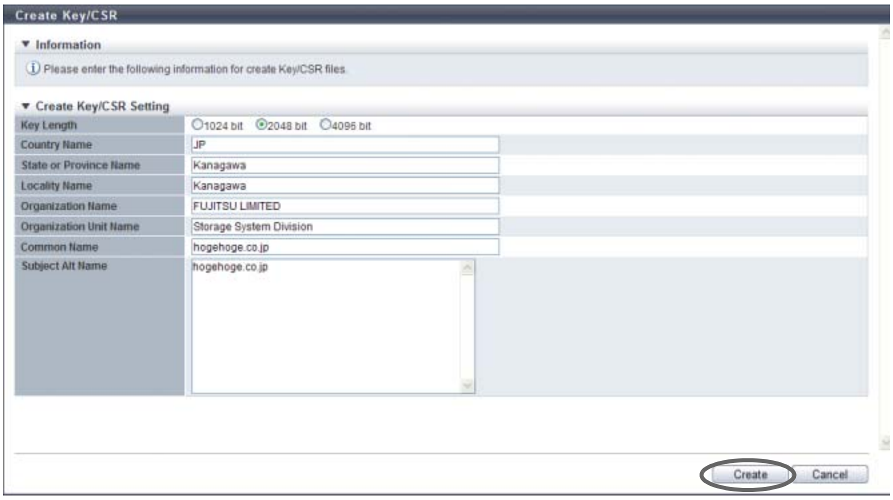
- Country Name
  Input the country code which conforms to ISO-3166 A2 (required).
  [Example] Japan: JP
  The following input conditions apply:
  - Alphabetic characters (upper case) (A - Z)
  - Two fixed letters
- State or Province Name
  Input the prefecture where the organization is located (required).
  [Example] Kanagawa
  The following input conditions apply:
  - Alphabetic characters (A - Z, a - z)
  - Spaces
  - Up to 63 characters
- Locality Name
  Input the municipality where the organization is located (required).
  [Example] Kawasaki
  The following input conditions apply:
  - Alphabetic characters (A - Z, a - z)
  - Spaces
  - Up to 63 characters
- Organization Name
  Input the organization name (required).
  [Example] XXX LIMITED
  The following input conditions apply:
  - Alphabetic characters (A - Z, a - z)
  - Numeric characters (0 - 9)
  - Spaces
  - Up to 63 characters
- Organization Unit Name
  Input the department/division name of the organization (required).
  [Example] YYYYY Division
  The following input conditions apply:
  - Alphabetic characters (A - Z, a - z)
  - Numeric characters (0 - 9)
  - Spaces
  - Up to 63 characters
- Common Name
  Specify Main IP Address or FQDN for ports (MNT and RMT) which are used to access from GUI via HTTPS connection.
  There are two methods to specify the main IP address; "IPv4" and "IPv6". The following IPv6 addresses can be used; "link local address", "global address", "unique local address", and "6to4 address". Refer to "Available IPv6 Address" (page 757) for details. When the current setting is displayed, the IPv6 address is displayed as an abbreviation.

The following input conditions apply:

- Main IP Address
  - For IPv4 address
    - xxx.xxx.xxx.xxx
      xxx: 1 - 255 for the top field (decimal)
      xxx: 0 - 255 for other fields (decimal)
    - Class must be A, B, or C.
  - For IPv6 address
    - xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
      xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
      Refer to "IPv6 Address Notation" (page 378) for details.
- Fully Qualified Domain Name (FQDN)
  - Alphanumeric characters (A - Z, 0 - 9)
  - Symbols (except "<", ">", "?", "!", "@", "#", "$", "%", "?", "\", "?", "&", and space)
  - Up to 63 characters

- Subject Alt Name
  Specify Main IP Address or FQDN for ports (MNT and RMT) which are used to access from GUI via HTTPS connection.
  There are two methods to specify the main IP address; "IPv4" and "IPv6". The following IPv6 addresses can be used; "link local address", "global address", "unique local address", and "6to4 address". Refer to "Available IPv6 Address" (page 757) for details. When the current setting is displayed, the IPv6 address is displayed as an abbreviation.
  - Main IP Address
    The following input conditions apply:
    - For IPv4 address
      - xxx.xxx.xxx.xxx
        xxx: 1 - 255 for the top field (decimal)
        xxx: 0 - 255 for other fields (decimal)
      - Class must be A, B, or C.
    - For IPv6 address
      - xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
        xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
        Refer to "IPv6 Address Notation" (page 378) for details.
  - Fully Qualified Domain Name (FQDN)
    The following input conditions apply:
    - Alphanumeric characters
    - Symbols (except "<", ">", "?", "!", "@", "#", "$", "%", "?", "\", "?", "&", and space)
    - Up to 511 characters (A linefeed code is also counted as one character.)

  Multiple IP addresses and FQDNs can be specified. Start a new line for each IP address or FQDN when specifying multiple IP addresses and FQDNs.
  If IPv4 addresses, IPv6 addresses, and FQDNs are specified together, up to 511 characters can be specified, including symbols (":" (colon), "." (period), and linefeed code).



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When items do not satisfy the input conditions
- When all of the required items are not input

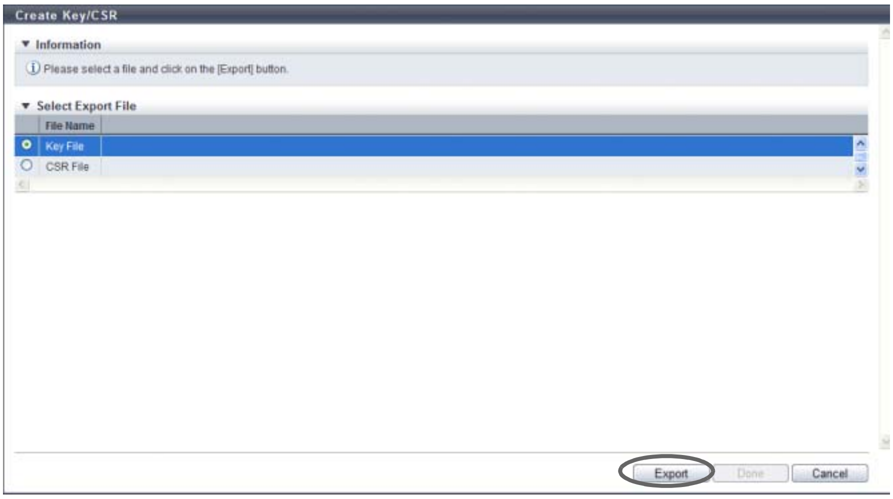
3 Click the [OK] button.



→ The creation of the CSR starts. When the creation of the CSR is complete, the screen for downloading the file is displayed.

4 Select the file that is to be downloaded, and click the [Export] button.

- File Name
  Select the target file to download from "Key File" or "CSR File".



→ A dialog box to download the file appears.

5 Save both the key file and the CSR file.

The default key file name is "ServerKey_serial number for the ETERNUS DX Disk storage system_YYYY-MM-DD_hh-mm-ss.txt".
The default CSR file name is "ServerCsr_serial number for the ETERNUS DX Disk storage system_YYYY-MM-DD_hh-mm-ss.txt".
(YYYY-MM-DD_hh-mm-ss: the date and time when the download screen (Step 4) is displayed.)
→ The files are saved.

Note

Perform Step 4 and Step 5 for each server key file and CSR file that is to exported.

6 Click the [Done] button to return to the [Network] screen.

End of procedure

11.2.3.17 Register SSL Certificate

This function registers the SSL server key, which was downloaded by using the [Create Key/CSR] function, and the SSL server certificate which was acquired from the certification authority.

Caution

- The HTTPS connection from GUI is disabled in the factory settings.
- There are two types of SSL certificate formats: the "SSL server certificate" and the "self-signed SSL certificate". The "SSL server certificate" is registered by using this function and the "self-signed SSL certificate" is created by using the procedure in "11.2.3.15 Create Self-signed SSL Certificate" (page 787).
  Register one of the certificates in the ETERNUS DX Disk storage system when using the HTTPS connection.
- To obtain the "SSL server certificate", the Certificate Signing Request (CSR) that is downloaded using the procedure in "11.2.3.16 Create Key/CSR" (page 790) must be send to the certification authority.
- Register the SSL server key and the SSL server certificate as a pair in the ETERNUS DX Disk storage system. If the combination of the SSL server key and the SSL server certificate is incorrect, accessing from GUI via the HTTPS connection is not possible.
- After the SSL server key and the SSL server certificate have been created, the information must be updated in the storage system before accessing from GUI via the HTTPS connection. Log out from GUI and wait a few minutes before logging in again.
- When the SSL server key and the SSL server certificate have been registered in the ETERNUS DX Disk storage system, the setting PC, which has accessed from GUI via the HTTPS connection, will be forced to disconnect.

The procedures to create SSL server key and the SSL server certificate are as follows:

Procedure

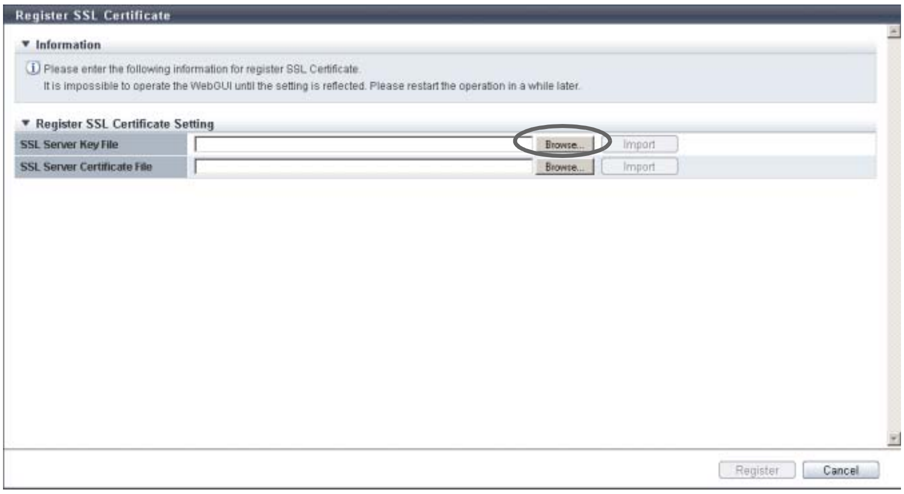
1 Click [Register SSL Certificate] in [Action].

Caution

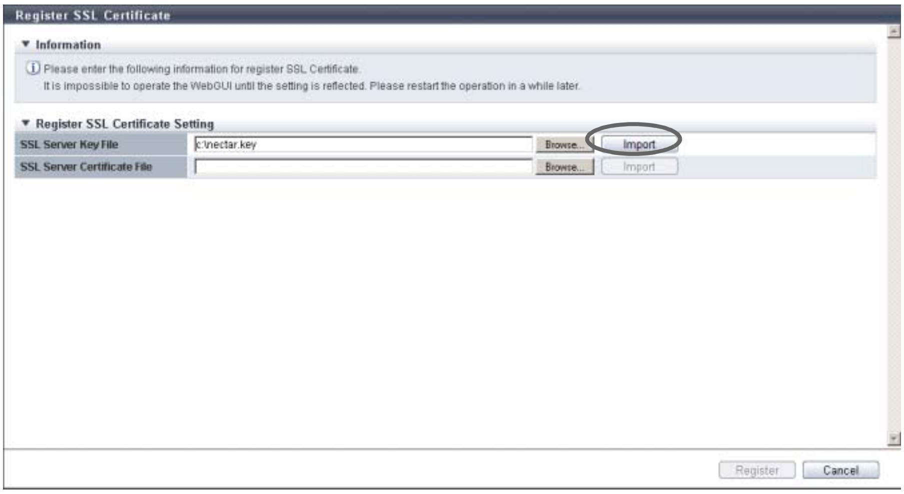
The SSL server key downloaded using the procedure in "11.2.3.16 Create Key/CSR" (page 790) and the "SSL server certificate" acquired from the certification authority are required before this action.

2 Click the [Browse...] button to specify the path to the "SSL Server Key File".

- SSL Server Key File
  Click the [Browse...] button to specify the SSL server key file, or directly input the path to the SSL server key file.
  Click the [Import] button to import the SSL server key file to GUI. When importing has been completed, "Imported" is displayed.



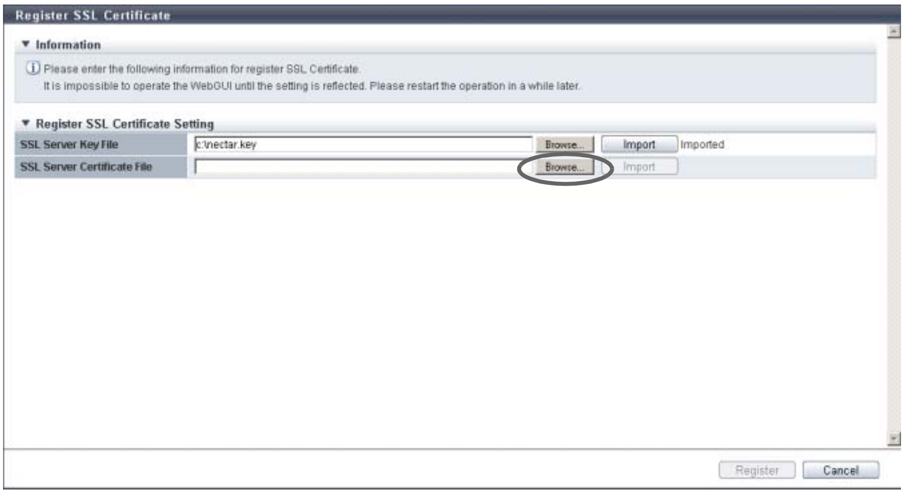
3 Click the [Import] button.



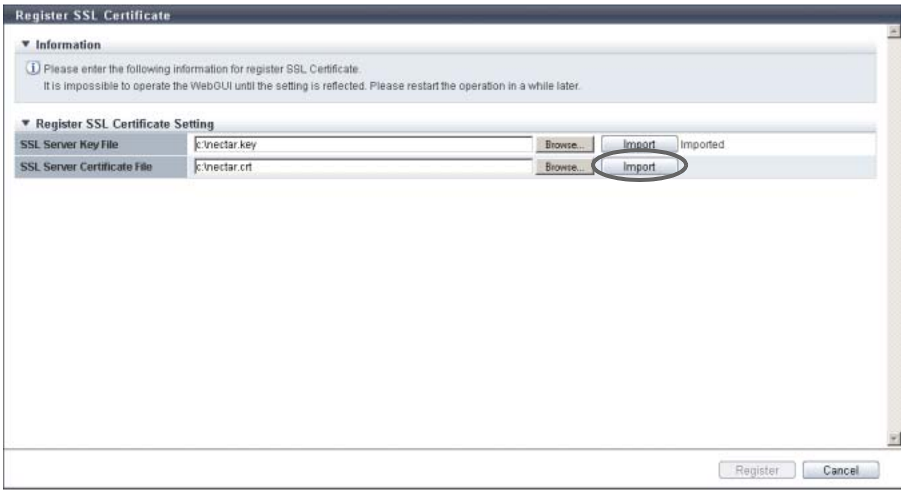
→ "Imported" is displayed.

4 Click the [Browse...] button to specify the path to the "SSL Server Certificate File".

- SSL Server Certificate File
  Click the [Browse...] button to specify the SSL server certificate file, or directly input the path to the SSL server certificate file.
  Click the [Import] button to import the SSL server certificate file to GUI. When importing has been completed, "Imported" is displayed.

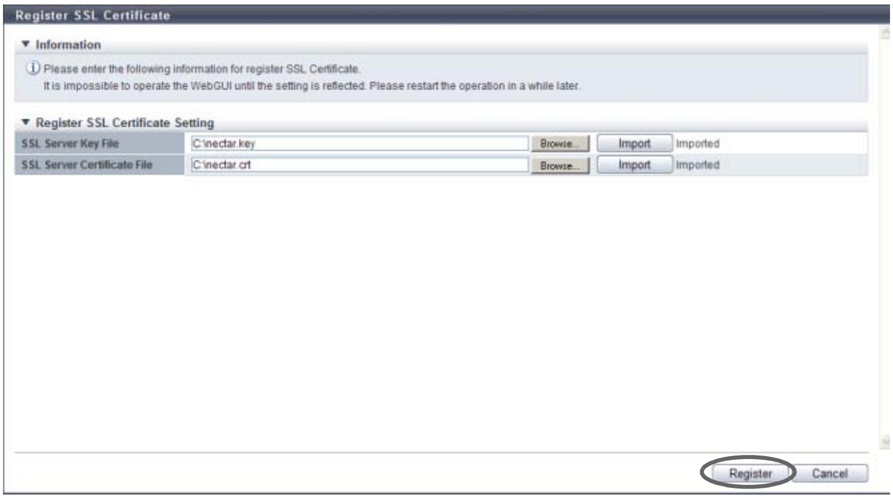


5 Click the [Import] button.



→ "Imported" is displayed.

6 Confirm that the "SSL server key file" and the "SSL server certificate file" have been imported, and click the [Register] button.



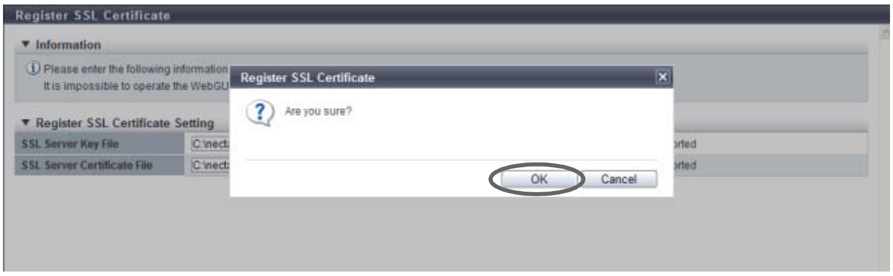
→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When the imported file was not the "SSL server key file"
- When the imported file was not the "SSL server certificate file"
- When the imported "SSL server certificate file" was not the certificate which corresponds to the SSL server key

7 Click the [OK] button.



→ The registration of the SSL server key and SSL server certificate starts.

8 Click the [Done] button to return to the [Network] screen.

Caution

After registering the SSL server key or SSL server certificate, the information must be updated in the ETERNUS DX Disk storage system before being accessed from GUI via the HTTPS connection. Log out from GUI and wait a few minutes before logging in again.

End of procedure

11.2.4 Remote Support (REMCS) for Regions other than EMEA

This section describes remote support management (by REMCS) for regions other than EMEA.
Remote support management (by REMCS) provides the following functions:

11.2.4.1 Display Communication Log

This function displays the communication log between the ETERNUS DX Disk storage system and REMCS center using the Remote Support function.
When the Remote Support function cannot be operated properly, for example, cannot be connected to the REMCS center, use this log to identify the cause of the problem.
The communication log includes requests from the ETERNUS DX Disk storage system to the server, and responses from the server to the ETERNUS DX Disk storage system. Only the communication log of the last executed event is displayed.

Caution

If the settings in "11.2.4.2 Setup Remote Support" (page 800) has not been completed in advance, this function cannot be used.

Note

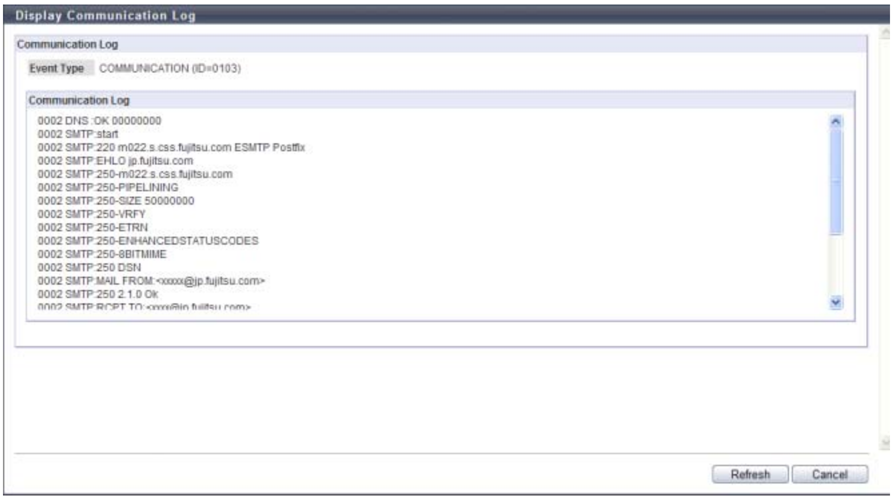
Click the [ ] icon or the [Refresh] button to update to the latest screen.

The procedure to display communication log is as follows:

Procedure

1 Click [Display Communication Log] in [Action].

2 Check the displayed "Event Type" and the "Communication Log".



3 Click the [Cancel] button to return to the screen when starting this function in Step 1.

End of procedure

11.2.4.2 Setup Remote Support

This function registers the customer information and communication environment information required to receive Remote Support from the REMote Customer Support system (REMCS) center.
"REMCS" is a unique remote maintenance system offered by Fujitsu. REMCS provides maintenance functions as follows:

- Failure Notice
  This function reports various failures that occur in the ETERNUS DX Disk storage system to the REMCS center. The maintenance engineer is notified of a failure immediately.
- Information Transfer
  This function sends information such as logs and configuration information to be used when checking a failure. It reduces the time required to collect information that is to be transferred to the REMCS center.
- Firmware Download
  The latest firmware in the REMCS center is automatically registered in the ETERNUS DX Disk storage system. This function ensures that the latest firmware is registered in the ETERNUS DX Disk storage system, and prevents known errors from occurring. Firmware can also be registered manually.

Caution

- REMCS cannot be used when the AIS Connect function is being used. Disable the AIS Connect function, and then set the remote support (REMCS) parameters. Refer to "11.1.4 Remote Support (AIS Connect) for Regions other than Japan" (page 719) for details (for regions other than Japan).
- Use the IPv4 addresses for the IP addresses of the proxy server, the SMTP server, the POP server, and the HTTP server. IPv6 addresses cannot be used.

Note

- When changing the registered information, use the procedure in "11.2.4.3 Update Customer Information" (page 805) and the "11.2.4.4 Update Communication Environment Information" (page 808).
- The information files (customer information file and communication environment information file) created by using REMCS Environment Setup Assist Tool (REMCS ESAT) can be imported to the storage system, to simplify the input operation required to be set for each storage system.
  - Only the common device information can be imported from the information file. The individual device information is required to be specified after importing the information file.
  - Just importing the information file will not automatically update the information in the ETERNUS DX Disk storage system. After specifying all the necessary information, click the [Set] button.

The procedure to specify the Remote Support settings is as follows:

Procedure

1 Click [Setup Remote Support] in [Action].

2 Specify the parameters, and click the [Set] button.

● Information File

- Customer Information File
  Import the "customer information file", which was created using the REMCS ESAT, to the ETERNUS DX Disk storage system.
  Click the [Browse...] button to specify the "customer information file", or directly input the path to the "customer information file".
- Customer Information File
  Import the "communication environment information file", which was created using the REMCS ESAT, to the ETERNUS DX Disk storage system.
  Click the [Browse...] button to specify the communication environment information file, or directly input the path to the communication environment information file.

Note

When importing Remote Support settings to the ETERNUS DX Disk storage system all at once, click the [Browse...] button to specify the location where the settings file has been stored, and click the [Import] button.

● Customer Information

Note

Refer to Step 2 in the "11.2.4.3 Update Customer Information" (page 805) for setting items.

Communication Environment Information

Note

Refer to Step 2 in the "11.2.4.4 Update Communication Environment Information" (page 808) for setting items.

Detailed Configuration Information

- Data Transmission Method
  Select whether to "Split" or "Do not Split" into the specified size.
  Select "Split large E-mail into multiple E-mails" or "Split large data into multiple E-mails", and specify the segment size, when segmenting outgoing mail.
  If the mail server does not allow the sending of segmented mail using "Split large E-mail into multiple E-mails", select "Split large data into multiple E-mails" or "Do not Split".
  - Split
    Outgoing mail is segmented. There are two methods for mail message fragmentation: "Split large E-mail into multiple E-mails" and "Split large data into multiple E-mails".
    - Split large E-mail into multiple E-mails
      Outgoing mail is segmented into the specified size (64 - 6400KB).
    - Split large data into multiple E-mails
      The file attached to the E-mail is segmented into several pieces, turned into one E-mail in the specified size (64 - 512KB), and sent in several transmissions.
  - Do not Split
    The message is sent as one E-mail without being segmented.
- Specify Storage System Name for HELO/EHLO Announcement when Sending Mail
  Select "Specify" or "Do not specify" for the ETERNUS DX Disk storage system name for HELO/EHLO announcement when sending mail.
  When "Specify" is selected, enter the domain.
  The following input condition applies:
  - Up to 63 alphanumeric characters and symbols (except space)

  The domain of the HELO/EHLO Announcement must be specified in the mail protocol.
  If "Do not specify" has been selected, E-mails are sent using the strings after the "@" of the sender mail addresses as domains.
  If the mail server does not allow using the section after the "@" of the sender mail address as the domain, select "Specify" and input the appropriate domain.

Result notification information

- Administrator
  Select "Notification" or "Not Notification" for the customer manager of the setting confirmation result at the REMCS center.
  Select "Notification" for the "Administrator" or the "Connection check operator" and confirm the result.

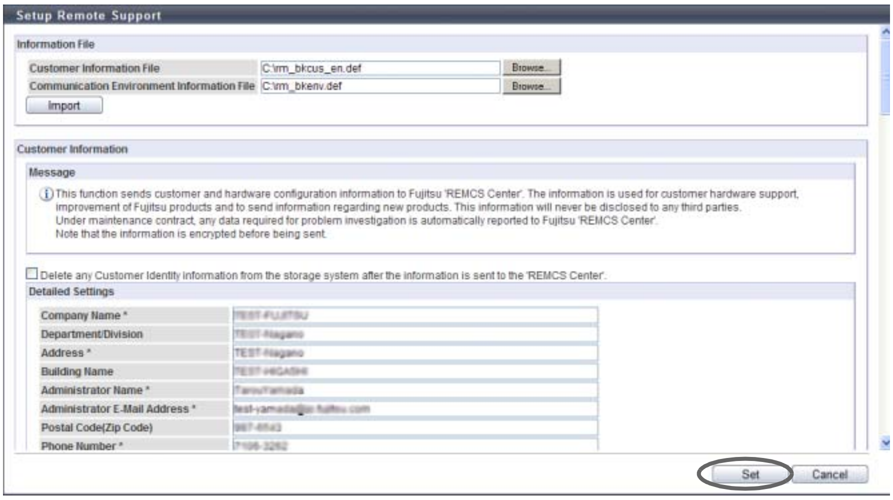
- Connection check operator
  Select "Notification (Standard E-Mail format)", "Notification (Simple E-Mail format for cell phone)" or "Not Notification" for the connection check operator of the setting confirmation result at the REMCS center.
  If notifying, input the "Connection check operator E-Mail Address".
  Specify the "Connection check operator" if there is another person who needs to be notified of the setting confirmation result, other than the administrator.
- Connection check operator E-Mail Address
  If notifying the connection check operator of the setting confirmation result at the REMCS center, input the E-mail address.
  The following input condition applies:
  - Up to 60 alphanumeric characters and symbols (except space)

Time Information

Caution

The timer parameter settings do not normally require modification.
If changing the default value, select the "Change following Timing Parameter items" checkbox.

- SMTP Response Timeout (sec.)
  Input the timeout limit when using SMTP connection.
  The following input condition applies:
  - Numeric characters ("1" - "3600")
- SMTP Retry Count
  Input the retry number of SMTP.
  The following input condition applies:
  - Numeric characters ("1" - "60")
- SMTP Retry Interval (sec.)
  Input the intervals for retrying SMTP.
  The following input condition applies:
  - Numeric characters ("1" - "3600")
- HTTP Timeout (sec.)
  Input the timeout limit when using HTTP connection.
  The following input condition applies:
  - Numeric characters ("1" - "3600")
- HTTP Retry Count
  Input the retry number of HTTP.
  The following input condition applies:
  - Numeric characters ("1" - "60")
- HTTP Retry Interval (sec.)
  Input the intervals for retrying HTTP.
  The following input condition applies:
  - Numeric characters ("1" - "3600")
- Queue Time before Sending Mails (msec.) (only when POP Before SMTP authentication is enabled)
  Input the waiting time for sending mail.
  The following input condition applies:
  - Numeric characters ("1" - "3600")



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When the [Set] button is clicked without setting the required item (items with "*")
- When the [Set] button is clicked while invalid values had been specified
- When the selected customer information file is not correct
- When file format of the selected customer information file is not correct
- When "MNT" is specified for the "LAN Port used for Remote Support" and when the IP Address of the Proxy server/SMTP server/POP server is the same as the broadcast address of the MNT port
- When "RMT" is specified for the "LAN Port used for Remote Support" and the IP Address of the Proxy server/SMTP server/POP server is the same as the broadcast address of the RMT port
- When the IP address of the Proxy server/SMTP server/POP server is the same as the local host address

3 Click the [OK] button.



→ Setting of the remote support starts.

4 Click the [Done] button to return to the screen when starting this function in Step 1.

Caution

After completing the setting, the REMCS center sends the setting confirmation result to the "Administrator E-Mail Address" or the "Connection check operator E-Mail Address". Make sure to confirm the setting results.

End of procedure

11.2.4.3 Update Customer Information

This function updates the customer information that is registered for the REMCS center.

Caution

- If the settings in "11.2.4.2 Setup Remote Support" (page 800) has not been completed in advance, this function cannot be used.
- When Remote Support is "Stopped", customer information cannot be updated.

Note

- Customer information saved in the ETERNUS DX Disk storage system (*1) can be deleted after transmitting the information to the REMCS center. Select the "Delete any Customer Identity information from the storage system after the information is sent to the 'REMCS Center'. " checkbox to delete the information. Note that selecting the checkbox requires entering customer information whenever updating the information.

  *1: Customer Identity information means "Administrator Name", "Administrator E-Mail Address ", "Phone Number", "FAX Number", and "Field Engineer E-Mail Address".
- The Remote Support setting information file (customer information file) created by using REMCS Environment Setup Assist Tool (REMCS ESAT) can be imported to the ETERNUS DX Disk storage system, to simplify the input operation required to be set for each storage system.

The procedure to update customer information is as follows:

Procedure

1 Click [Update Customer Info] in [Action].

2 Set the customer information again, and click the [Set] button.

- Information File
  - Customer Information File
    Import the "Customer Information File", which was created using the REMCS ESAT, to the ETERNUS DX Disk storage system.
    Click the [Browse...] button to specify the "Customer Information file", or directly input the path to the "Customer Information File".

Note

When importing customer information to the ETERNUS DX Disk storage system all at once, click the [Browse...] button to specify the location where the customer information file has been stored, and click the [Import] button.

Caution

If the [Import] button is clicked in the following conditions, an error screen appears.

- When the selected customer information file is not correct
- When file format of the selected customer information file is not correct

● Customer Information

- Checkbox
  If the "Delete any Customer Identity information from the storage system after the information is sent to the 'REMCS Center'." checkbox is selected, customer information saved on the ETERNUS DX disk storage system is deleted after transmitting the information to the REMCS center.

● Detailed Settings ("*" indicates the required setting items)

- Company Name *
  Input the company name that owns the ETERNUS DX Disk storage system. The following input condition applies:
  - Up to 60 alphanumeric characters and symbols
- Department/Division
  Input the department or division that owns the ETERNUS DX Disk storage system.
  The following input condition applies:
  - Up to 40 alphanumeric characters and symbols
- Address*
  Input the address of the company that owns the ETERNUS DX Disk storage system.
  The following input condition applies:
  - Up to 60 alphanumeric characters and symbols
- Building Name
  Input the building name where the company that owns the ETERNUS DX Disk storage.
  The following input condition applies:
  - Up to 40 alphanumeric characters and symbols
- Administrator Name*
  Input the system administrator's name that manages the ETERNUS DX Disk storage system.
  The following input condition applies:
  - Up to 40 alphanumeric characters and symbols
- Administrator E-Mail Address*
  Input the E-mail address of the system administrator who manages the ETERNUS DX Disk storage system.
  The following input condition applies:
  - Up to 60 alphanumeric characters and symbols (except space)

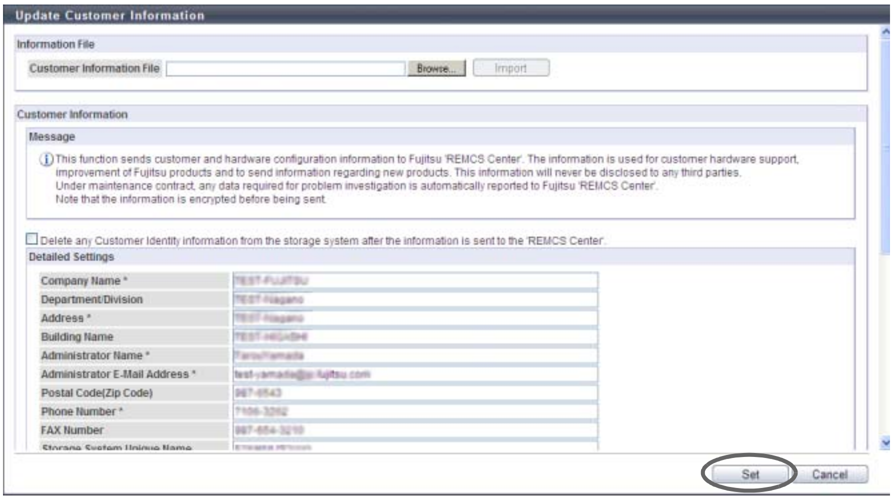
- Postal Code (Zip Code)
  Input the postal code for the company that owns ETERNUS DX Disk storage system.
  The following input condition applies:
  - Up to 10 alphanumeric characters and symbols
- Phone Number*
  Input the phone number for the company that owns the ETERNUS DX Disk storage system.
  The following input condition applies:
  - Up to 20 numeric characters and symbols (except space)
- FAX Number
  Input the FAX number for the company that owns the ETERNUS DX Disk storage system.
  The following input condition applies:
  - Up to 20 numeric characters and symbols (except space)
- Storage System Unique Name
  Input the nickname for the ETERNUS DX Disk storage system.
  The following input condition applies:
  - Up to 32 alphanumeric characters and symbols (except space)
- Country of Installation (ISO3166 A2)* Example: JP, US, DE, etc.
  Input the country code for the country where the ETERNUS DX Disk storage system is located. (required)
  The following input conditions apply:
  - Two fixed letters
  - Capital letters or "99"

Installation Location

- Address
  Input the address where the ETERNUS DX Disk storage system is located.
  The following input condition applies:
  - Up to 60 alphanumeric characters and symbols
- Building Name
  Input the building name where the ETERNUS DX Disk storage system is located.
  The following input condition applies:
  - Up to 40 alphanumeric characters and symbols

Information filled by Field Engineers

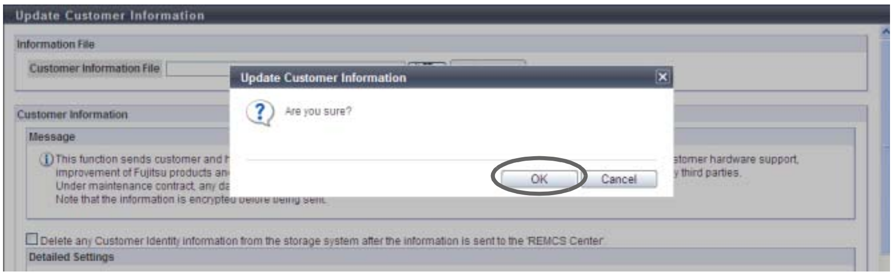
- Installation Date
  Input the date when the ETERNUS DX Disk storage system is installed.
  - YYYY-MM (YYYY: Year (AD), MM: Month (01 - 12))
- Field Engineer E-Mail Address
  Input the E-mail address for the field engineer who installed the ETERNUS DX Disk storage system.
  The following input condition applies:
  - Up to 60 alphanumeric characters and symbols (except space)
- Customer Code
  Input the customer code.
  The following input condition applies:
  - Up to 8 alphanumeric characters and symbols (except space)



→ A confirmation screen appears.

> **Caution**
>
> If the [Set] button is clicked in the following conditions, an error screen appears.
> - When required items (items with "*") are not specified
> - When wrong values are entered

3 Click the [OK] button.



→ The customer information is updated.

4 Click the [Done] button to return to the screen when starting this function in Step 1.

End of procedure

11.2.4.4 Update Communication Environment Information

This function updates the customer information that is registered for the REMCS center.

> **Caution**
>
> - If the settings in "11.2.4.2 Setup Remote Support" (page 800) has not been completed in advance, this function cannot be used.
> - When Remote Support is "Stopped", communication environment information cannot be updated.

Note

The Remote Support setting information file (customer information file) created by using REMCS Environment Setup Assist Tool (REMCS ESAT) can be imported to the ETERNUS DX Disk storage system, to simplify the input operation required to be set for each storage system.

The procedure to update communication environment information is as follows:

Procedure

1. Click [Update Connection Info] in [Action].
2. Specify the parameters, and click the [Set] button.

- Information File
  - Communication Environment Information File
    Import the "communication environment information file", which was created using the REMCS ESAT, to the ETERNUS DX Disk storage system.
    Click the [Browse...] button to specify the communication environment information file, or directly input the path to the communication environment information file.

    Note

    When importing Remote Support settings to the ETERNUS DX Disk storage system all at once, click the [Browse...] button to specify the location where the settings file has been stored, and click the [Import] button.

- Communication Environment Information
  - Connection
    - Connection Type
      Select the connection type when using the REMCS operation.
      - Internet Connection
      - Internet Connection (Mail only)
      - P-P Connection
      - P-P Connection (Mail only)
      - P-P Connection (VPN Connection)
      - P-P Connection (VPN Connection Mail only)
    - LAN Port used for Remote Support
      Select the LAN port of the ETERNUS DX Disk storage system that is used for REMCS operation from "MNT" or "RMT".

- Service
  - Scheduled Connection Time *
    Input the time for scheduled REMCS connection. (*1)
    The following input conditions apply:
    - Numeric characters
    - Hour ("00" - "23")
    - Minute ("00" - "59")

    *1: Different times are specified in the factory settings in order to disperse the load on the REMCS center.
  - Scheduled Connection Period *
    Select the term for scheduled REMCS connection.
    - Every Day
    - Every Day (except Sunday)
    - Every Day (except Saturday and Sunday)
    - Once per Week
  - Specify the Day of the Week
    When "Once per Week" is selected for "Scheduled Connection Period", select the day of the week to execute scheduled REMCS connection.
    - Sunday
    - Monday
    - Tuesday
    - Wednesday
    - Thursday
    - Friday
    - Saturday
- Proxy Server
  - Proxy Server
    Input the IP address or the domain name of the proxy server that is used for REMCS operation.
    The following input condition applies:
    - Up to 63 alphanumeric characters and symbols (except space)
  - Port No.
    Input the port number of the proxy server.
    The following input condition applies:
    - Numeric characters ("0" - "65535")
  - User Name
    Input the user name when using the proxy server.
    The following input condition applies:
    - Up to 32 alphanumeric characters and symbols (except space)
  - Password
    Input the password of the user name when using the proxy server.
    The following input condition applies:
    - Up to 64 alphanumeric characters and symbols (except space)

- SMTP Server
  - SMTP Server *
    Input the IP address or the domain name of the SMTP server that is used for REMCS operation.
    The following input condition applies:
    - Up to 63 alphanumeric characters and symbols (except space)
  - Port No. *
    Input the port number of the SMTP server.
    The following input condition applies:
    - Numeric characters ("0" - "65535")
  - Sender Mail Address *
    Input the sender E-Mail address of mails sent by the ETERNUS DX Disk storage system for REMCS operations.
    The following input condition applies:
    - Up to 63 alphanumeric characters and symbols (except space)
- SMTP Authentication Information
  - Authentication Type
    Select the SMTP authentication type.
    - No SMTP Authentication
    - POP Before SMTP Authentication
    - AUTH SMTP Authentication
  - Authentication Method
    When "AUTH SMTP Authentication" is selected for "Authentication Type", specify the SMTP authentication method.
    - Automatic
    - CRAM-MD5
    - PLAIN
    - LOGIN
  - POP Server
    When the "Authentication Type" is "POP Before SMTP Authentication", enter the domain name or the IP address of the POP server that is used for SMTP Authentication.
    The following input condition applies:
    - Up to 63 alphanumeric characters and symbols (except space)
  - Port No.
    Input the port number that is used when communicating with the POP server.
    The following input condition applies:
    - Numeric characters ("0" - "65535")
  - User Name
    Input the user name that is used when communicating with the POP server.
    This setting is enabled when selecting "POP Before SMTP Authentication" or "AUTH SMTP Authentication" for the "SMTP Authentication Type".
    The following input condition applies:
    - Up to 32 alphanumeric characters and symbols (except space)
  - Password
    Input the password that is used when communicating with the POP server.
    This setting is enabled when selecting "POP Before SMTP Authentication" or "AUTH SMTP Authentication" for the "SMTP Authentication Type".
    The following input conditions applies:
    - Up to 64 alphanumeric characters and symbols (except space)

- REMCS Center
  - REMCS Center *
    Select the REMCS center (in each country) where the ETERNUS DX Disk storage system is connected (required).
    - Blank (default setting)
    - Fujitsu America
    - Australia
    - Brazil
    - Hong-Kong
    - China
    - Indonesia
    - Korea
    - Malaysia
    - Philippine
    - Singapore
    - Taiwan
    - Thailand
    - Vietnam
    - Individual support in Hawaii
    - OSC

    Caution

    If "Direct Input Setting" is displayed, the center cannot be changed to another location.

- Detailed Configuration Information

  Note

  Refer to Step 2 (page 801) in "11.2.4.2 Setup Remote Support" (page 800) for setting items.

- Result notification information

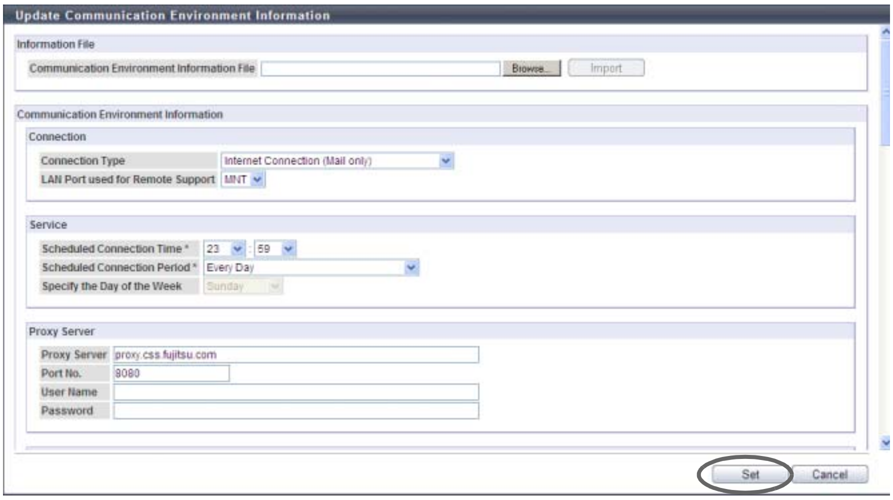
  Note

  Refer to Step 2 (page 801) in "11.2.4.2 Setup Remote Support" (page 800) for setting items.

- Time Information

  Note

  Refer to Step 2 (page 801) in "11.2.4.2 Setup Remote Support" (page 800) for setting items.



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When the [Set] button is clicked without setting the required item (items with "*")
- When the [Set] button is clicked while invalid values had been specified
- When the selected setting information file is not correct
- When file format of the selected setting information file is not correct
- When "MNT" is specified for the "LAN Port used for Remote Support" and when the IP Address of the Proxy server/SMTP server/POP server is the same as the broadcast address of the MNT port
- When "RMT" is specified for the "LAN Port used for Remote Support" and the IP Address of the Proxy server/SMTP server/POP server is the same as the broadcast address of the RMT port
- When the IP address of the Proxy server/SMTP server/POP server is the same as the local host address

3 Click the [OK] button.



→ Changing of the communication environment information starts.

4 Click the [Done] button to return to the screen when starting this function in Step 1.

Caution

After completing the setting, the REMCS center sends the setting confirmation result to the "Administrator E-Mail Address" or the "Connection check operator E-Mail Address". Make sure to confirm the setting results.

End of procedure

11.2.4.5 Setup Log Sending Parameters

This function transfers the internal log of the ETERNUS DX Disk storage system to the REMCS center.
There are two log sending methods: "Automatic" and "Manual".

- Configure Automatic Log Transmission
  The ETERNUS DX Disk storage system sends log periodically or when an event occurs.
- Immediately Send Log Manually
  The log is sent manually.

Caution

This function cannot be used under the following conditions:

- When the procedure in "11.2.4.2 Setup Remote Support" (page 800) is not performed.
- When a problem is detected in the Remote Support settings
- When the "Receiver Mail Address" (REMCS center) is not specified for the Remote Support
- The Remote Support is stopped

The procedure to send log is as follows:

Configure Automatic Log Transmission

The ETERNUS DX Disk storage system sends log periodically or when an event occurs.

Procedure

1 Click [Setup Log Sending Parameters] in [Action].

2 Specify the parameters, and click the [Set] button.

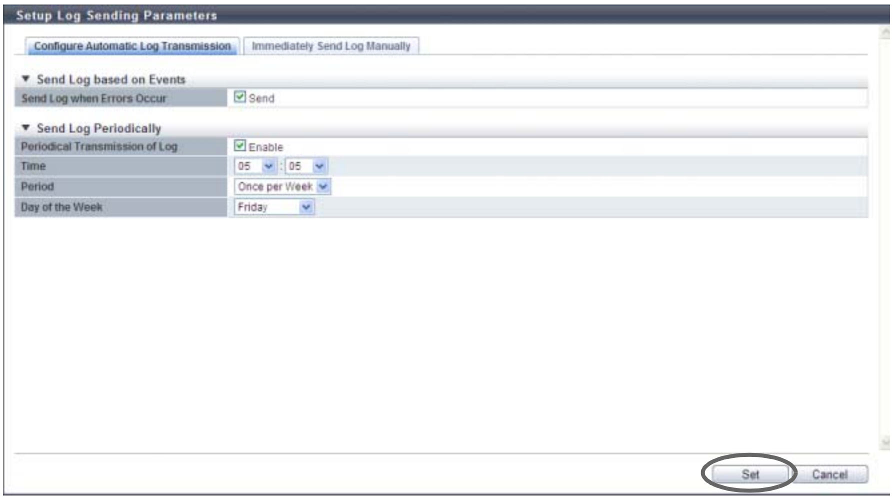
- Send Log based on Events

  - Send Log when Errors Occur
    To send logs automatically in the case of a failure, select the "Send" checkbox. The default state of "Send Log when Errors Occur" setting is, if the Remote Support setting using the [Setup Remote Support] function has been completed, "Send" will be enabled.

Send Log Periodically

- Periodical Transmission of Log
  To send log periodically, select the "Enable" checkbox. The default state of "Periodical Transmission of Log" is, if the Remote Support setting using the [Setup Remote Support] function has been completed, "Enable" will be selected.
- Time
  Specify between "0:00" and "23:59" for the time to send logs periodically. A time between "10:00" and "15:00" is set for the default setting. (*1)
- Period
  Specify the cycle when sending logs periodically.
  - Once per Week
  - Every Day
- Day of the Week
  Specify the day of the week when sending logs periodically. The day of the week can be specified only when "Once per week" has been specified as the cycle when sending logs periodically. A day between "Monday" and "Friday" is set for the default setting. (*1)
  - Sunday
  - Monday
  - Tuesday
  - Wednesday
  - Thursday
  - Friday
  - Saturday

*1: Different days and times are specified in the factory settings in order to disperse the load on the REMCS center.



→ A confirmation screen appears.

3 Click the [OK] button.



→ The parameter settings of log transmission (Automatic Log Transmission) are updated in the storage system.

4 Click the [Done] button to return to the screen when starting this function in Step 1.

End of procedure

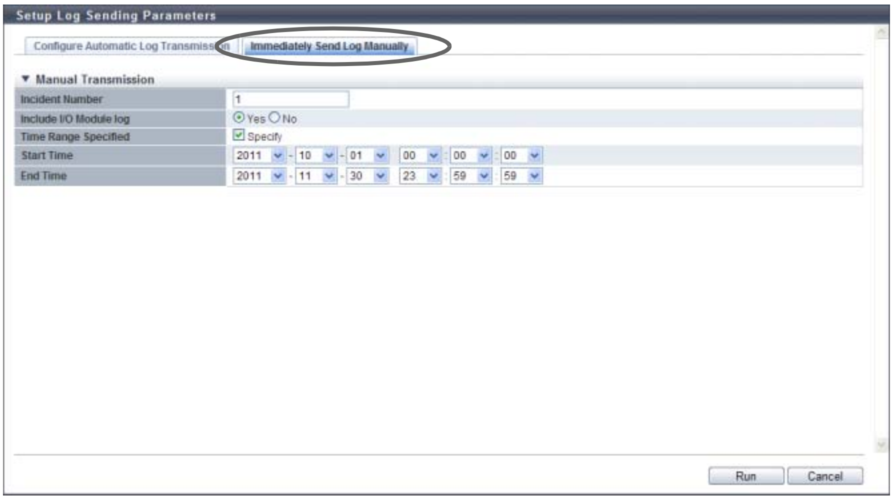
Immediately Send Log Manually

In this screen, send log manually and immediately.

Procedure

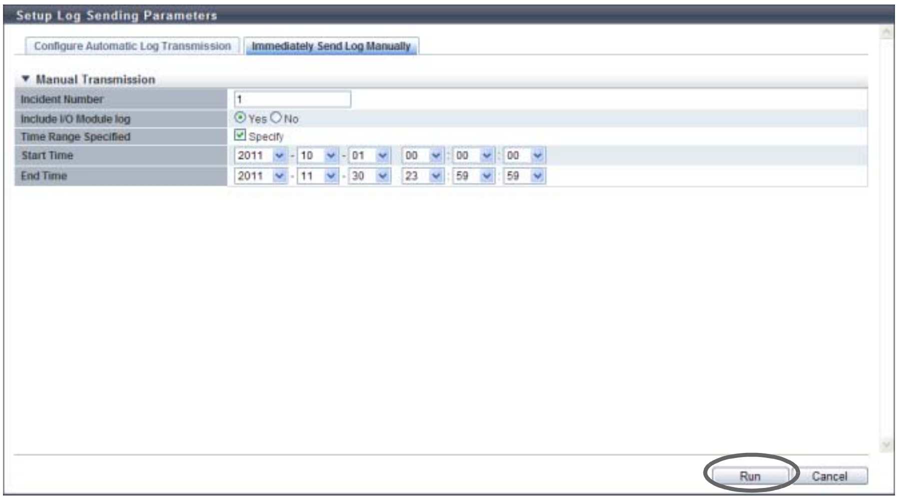
1 Click [Setup Log Sending Parameters] in [Action].

2 Click the [Immediately Send Log Manually] tab to change the screen.



3 Specify the parameters, and click the [Run] button.

- Incident Number
  Input the incident number to be added to the log to be sent.
  The following input condition applies:
  - Up to 15 alphanumeric characters and symbols (except spaces)
- Include I/O Module log
  Specify whether to collect the I/O module log. To obtain the I/O module log, select the "Yes" checkbox.
- Time Range Specified
  Select whether to specify the time range to export logs.
  To specify the time to send log, select the "Specify" checkbox, and specify the start and end time.
  If the time range has been specified, some of the logs just before and after the specified time range may also be collected.
- Start Time
  When "Specify" has been selected for "Time Range Specified", specify the start time for collecting logs.
  - YYYY-MM-DD hh:mm:ss (YYYY: Year (AD), MM: Month (01 - 12), DD: Day (01 - 31), hh: Hour (00 - 23), mm: Minute (00 - 59), ss: Second (00 - 59))
- End Time
  When "Specify" has been selected for "Time Range Specified", specify the end time for collecting logs.
  - YYYY-MM-DD hh:mm:ss (YYYY: Year (AD), MM: Month (01 - 12), DD: Day (01 - 31), hh: Hour (00 - 23), mm: Minute (00 - 59), ss: Second (00 - 59))



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- The incident number has not been entered or is incorrect
- When "Specify" has been selected for "Time Range Specified", but the start time or the end time has not been entered
- When "Specify" has been selected for "Time Range Specified", and the date specified for start time is earlier than the specified end time

4 Click the [OK] button.



→ Log transmission (Immediately Send Log Manually) is executed.

5 Click the [Done] button to return to the screen when starting this function in Step 1.

End of procedure

11.2.4.6 Stop/Restart Remote Support

This function temporarily stops the Remote Support function and starts again.
This function is used when the ETERNUS DX Disk storage system is stopped for a prolonged period such as for relocation.
This function switches the support status from "Operating" to "Stopped" or from "Stopped" to "Operating". In "Stopped", all the Remote Support functions, such as automatic notification of the ETERNUS DX Disk storage system errors to the REMCS center, are stopped.

Caution

- REMCS cannot be used when the AIS Connect function is being used. Disable the AIS Connect function, and then restart the remote support (REMCS). Refer to "11.1.4 Remote Support (AIS Connect) for Regions other than Japan" (page 719) for details (for regions other than Japan).
- If the settings in "11.2.4.2 Setup Remote Support" (page 800) has not been completed in advance, this function cannot be used.
- This function is not available when the ETERNUS DX Disk storage system status is "Maintenance Mode ON".
- The event of temporary stopping or restarting of the Remote Support function is transferred from the ETERNUS DX Disk storage system to the REMCS center.

Stopping Remote Support

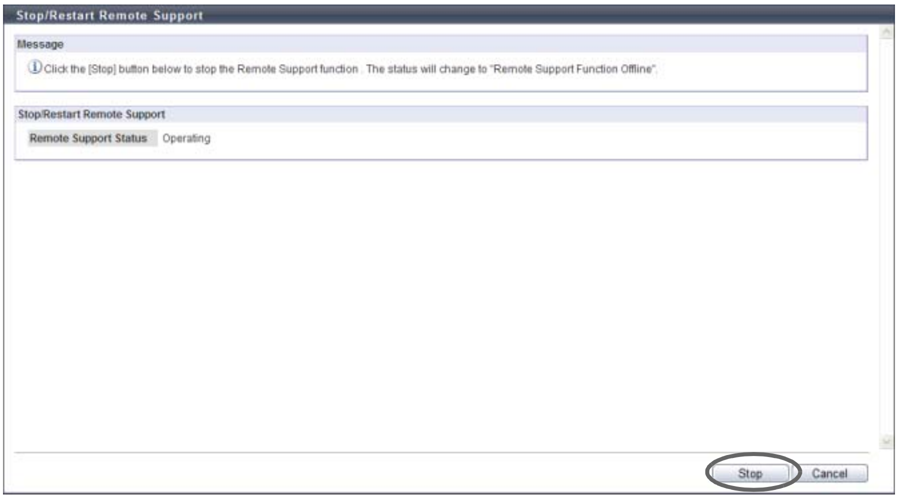
This function temporarily stops the Remote Support. The Remote Support can be stopped only when it is "Operating". The procedure to stop Remote Support is as follows:

Procedure

1 Click [Stop/Restart Remote Support] in [Action].

→ The current Remote Support status is displayed.

2 Click the [Stop] button.



→ A confirmation screen appears.

3 Click the [OK] button.



→ The Remote Support is stopped.

4 Click the [Done] button to return to the screen when starting this function in Step 1.

End of procedure

Restarting Remote Support

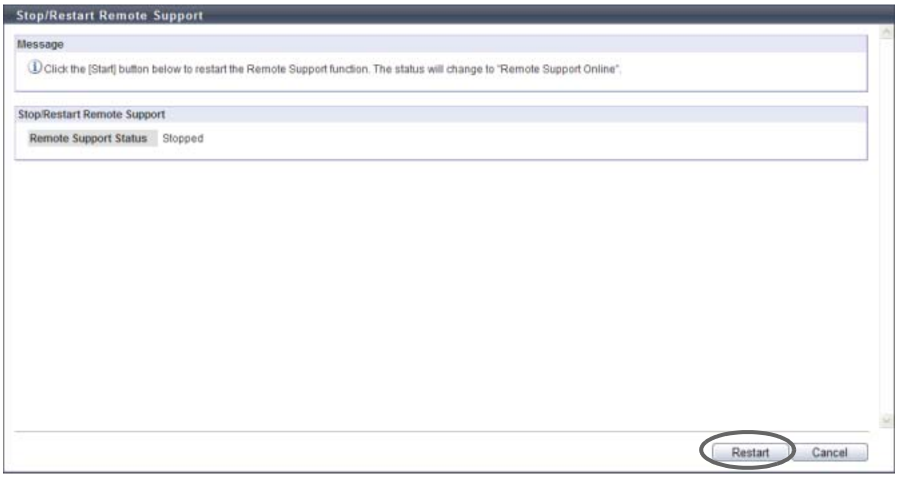
This function restarts the Remote Support. The Remote Support can be restarted only when it is "Stopped". The procedure to restart Remote Support is as follows:

Procedure

1 Click [Stop/Restart Remote Support] in [Action].

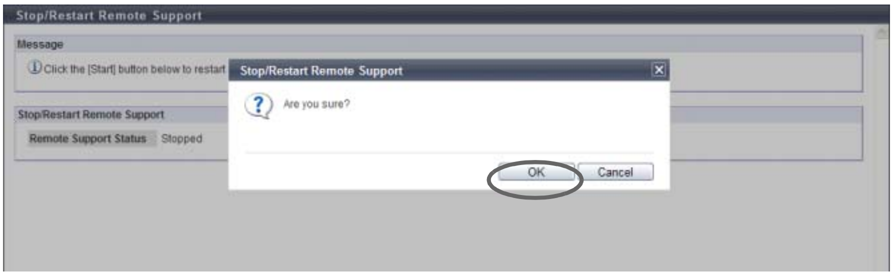
→ The current Remote Support status is displayed.

2 Click the [Restart] button.



→ A confirmation screen appears.

3 Click the [OK] button.



→ The Remote Support is restarted.

4 Click the [Done] button to return to the screen when starting this function in Step 1.

End of procedure

11.2.5 Remote Support (AIS Connect) for Regions other than Japan

This section describes remote support management (by AIS Connect) for regions other than Japan.
Remote support management (by AIS Connect) provides the following functions:

- Setup AIS Connect Environment
- Setup Remote Session Permission
- Send Log
- Test Server Connectivity
- Send AIS Connect Test Event
- Import Root Certificate

11.2.5.1 Setup AIS Connect Environment

This function sets up the basic information for AIS Connect.

Caution

- AIS Connect is not available when REMCS is being used. Suspend REMCS and then enable AIS Connect. Refer to "11.2.4.6 Stop/Restart Remote Support" (page 818) for details (for regions other than EMEA).
- Before using AIS Connect, make sure to read the terms and conditions regarding the handling of personal information with extreme caution. To agree with the terms and conditions, click the [I agree] button. Agreement is required only once before setting "Country of Installation (Country Code : Country Name)".
- Note that setting parameters for AIS Connect is applied only when "Enable" is selected for "AIS Connect".

Note

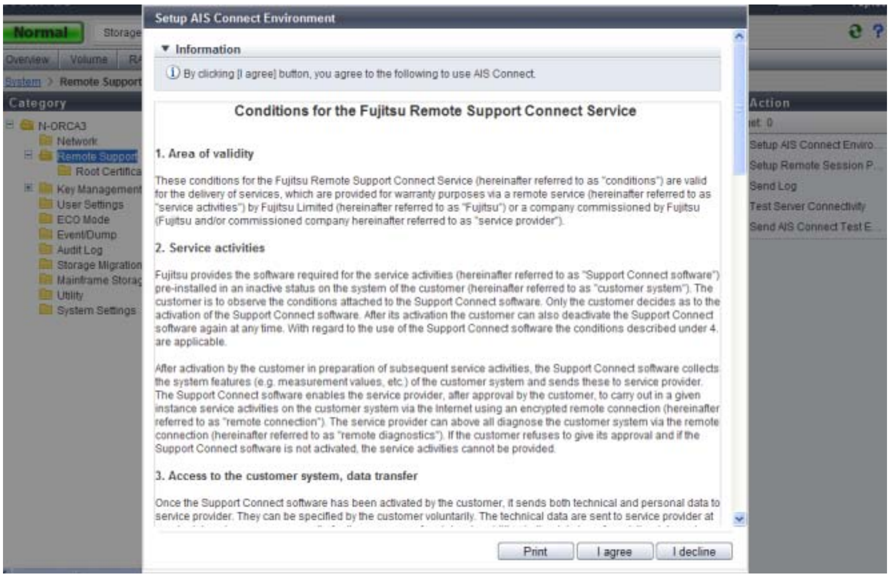
Even if the "AIS Connect" setting is changed to "Disable", the basic AIS Connect information in the ETERNUS DX Disk storage system is retained.

The procedure to set the AIS Connect information is as follows:

Procedure

1 Click [Setup AIS Connect Environment] in [Action].

2 Check the terms and conditions regarding the handling of personal information.



- When the [I agree] button is clicked

  → The [Setup AIS Connect Environment] screen appears. Proceed to Step 3.

- When the [I decline] button is clicked

  → Returns to the screen when starting this function in Step 1.

Note

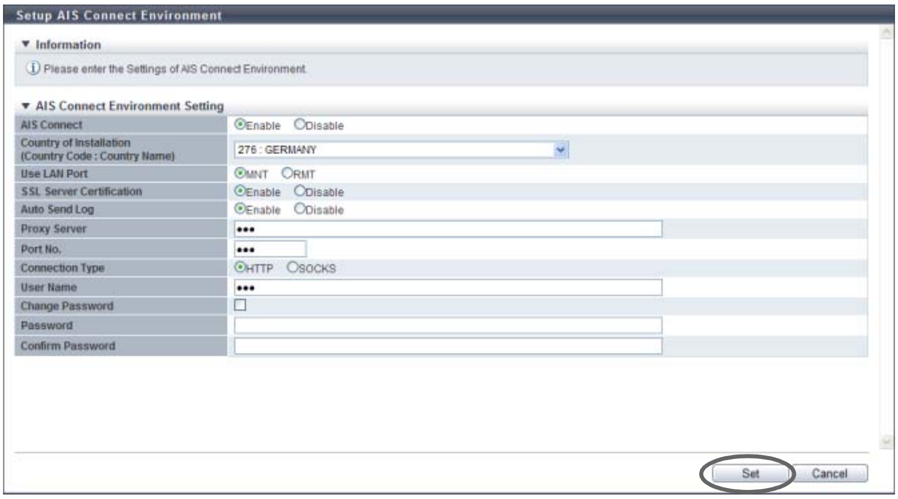
- The terms and conditions regarding the handling of personal information are displayed only when "Country of Installation (Country Code : Country Name)" is not specified.
- To print the terms and conditions regarding the handling of personal information, click the [Print] button.

3 Specify the parameters, and click the [Set] button.

- AIS Connect
  Select whether to enable or disable the AIS Connect function.
- Country of Installation (Country Code : Country Name)
  Select the country name to which the ETERNUS DX Disk storage system is shipped (where the storage system locates).
  Options for this item are displayed in "Country code : Country name" format. The country name is listed in English alphabetical order. "ISO 3166-1 numeric" is used as the country code.
- Use LAN Port
  Select the LAN port from "MNT" or "RMT" that is to be used for communication with the AIS Connect server.

- SSL Server Certification
  To use SSL server certification for communication with the AIS Connect server, select "Enable". To not use SSL server certification, select "Disable".
  When "Enable" is selected, server certification is performed with the root certificate that is registered in the ETERNUS DX Disk storage system for AIS Connect server communication. When there is no appropriate root certificate that authenticates server certification that is received from the AIS Connect server or when the root certificate has expired, communication with the AIS Connect server fails. The expiration date of the root certificate can be checked from the [Root Certificate] screen. Refer to "11.1.4.1 Root Certificate" (page 721) for details.
- Auto Send Log
  Select whether to enable or disable the automatic log transmission.
  When "Auto Send Log" is enabled and notification of Error Severity Level or Warning Level occurs, a log is collected and sent to the AIS Connect server in approximately five minutes. The maximum size of a log is 1.44MB. Note that I/O Module logs are not included.
  If a send log request is already performed once log collection is complete, send log requests are not performed. If a communication error occurs and a connection to the AIS Connect server cannot be established, logs cannot be sent. A log that fails to be sent is not resent.
- Proxy Server
  Input the IPv4 address or the Fully Qualified Domain Name (FQDN) of the proxy server. Make sure to input "Proxy Server" and "Port No." together.
  If a proxy server is not used, this item does not need to be set.
  - IPv4 address
    xxx.xxx.xxx.xxx
    xxx: 1 - 255 for the top field (decimal)
    xxx: 0 - 255 for other fields (decimal)
  - FQDN
    Up to 63 alphanumeric characters and symbols ("." (dot), ":" (colon), "-" (hyphen), and "_ " (underscore) can be used)
- Port No.
  Input the port number of the proxy server between 0 and 65535. Make sure to input "Proxy Server" and "Port No." together.
  If a proxy server is not used, this item does not need to be set.
- Connection Type
  Select the communication method for the proxy server.
  - HTTP
    Basic/NTLM HTTP authentication
  - SOCKS
    SOCKSv5 authentication
- User Name
  Specify the user name for the proxy server authentication.
  If a proxy server is not used, this item does not need to be set.
  The following input condition applies:
  - Up to 32 alphanumeric characters
- Change Password
  To change the proxy server authentication password, select the checkbox.
- Password
  Select the "Change Password" checkbox and then input the password for proxy server authentication. When inputting the password, "*" is displayed to hide the specified value.
  If a proxy server is not used, this item does not need to be set.
  The following input condition applies:
  - Up to 64 alphanumeric characters and symbols

- Confirm Password
  Select the "Change Password" checkbox and then input the password for proxy server authentication again. When inputting the password, "*" is displayed to hide the specified value.
  If a proxy server is not used, this item does not need to be set.
  The following input condition applies:
  - Up to 64 alphanumeric characters and symbols



→ A confirmation screen appears.

Caution

- An error screen appears in the following conditions (when "Enable" is selected for the AIS Connect function and a proxy server is specified):
  - When the specified "Proxy Server" does not satisfy the input conditions
  - When the same IP address is specified for "Proxy Server" and the MNT port or the RMT port
  - When the IP address for "Proxy Server" and the network address for the MNT port or the RMT port are the same
  - When the IP address for "Proxy Server" and the broadcast address for the MNT port or the RMT port are the same
  - When the same IP address is specified for "Proxy Server" and "AIS Connect Server"
  - When either of the "Proxy Server" or the "Port No." has been specified
  - When "Port No." does not satisfy the input conditions
  - When the "User Name" is not entered
  - When the "User Name" does not satisfy the input conditions
  - When "Password" is not entered (only when "Change Password" checkbox is selected)
  - When "Password" does not satisfy the input conditions (only when "Change Password" checkbox is selected)
  - When "Confirm Password" is not entered (only when "Change Password" checkbox is selected)
  - When "Confirm Password" does not satisfy the input conditions (only when "Change Password" checkbox is selected)
  - When "Password" does not match "Confirm Password" (only when "Change Password" checkbox is selected)
- When "Enable" is selected for "AIS Connect" and "Country of Installation (Country Code : Country Name)" is not specified, an error screen appears.

4 Click the [OK] button.



→ AIS Connect setting starts.

5 Click the [Done] button to return to the screen when starting this function in Step 1.

End of procedure

11.2.5.2 Setup Remote Session Permission

This function performs permission settings for remote sessions with the AIS Connect function. If a remote session is permitted, remotely controlling the ETERNUS DX80 S2/DX90 S2, ETERNUS DX410 S2/DX440 S2, or ETERNUS DX8100 S2/DX8700 S2 from a remote server (AIS Connect server) becomes available.

Caution

- Settings can be changed when "AIS Connect" is enabled. Refer to "11.2.5.1 Setup AIS Connect Environment" (page 821) for details.
- The permission setting of a remote session is released if one of the following conditions applies:
  - When a remote session is not detected before the timeout period that is specified for the timeout setting
  - When this function forbids remote sessions
  - When "AIS Connect" is disabled

Note

- The permission settings are retained even if the ETERNUS DX Disk storage system is rebooted or after recovery from a power failure. Note that the timer that monitors remote session connection is reset to "0"in this case.
- If the setting of this function is changed to forbid while a remote session is being performed, operations for this remote session are permitted until the user logs out. However, once this remote session is logged out from, this remote session cannot be logged into while the remote session is forbid.
- When "AIS Connect" is disabled, all remote sessions that are currently being performed are immediately disconnected.

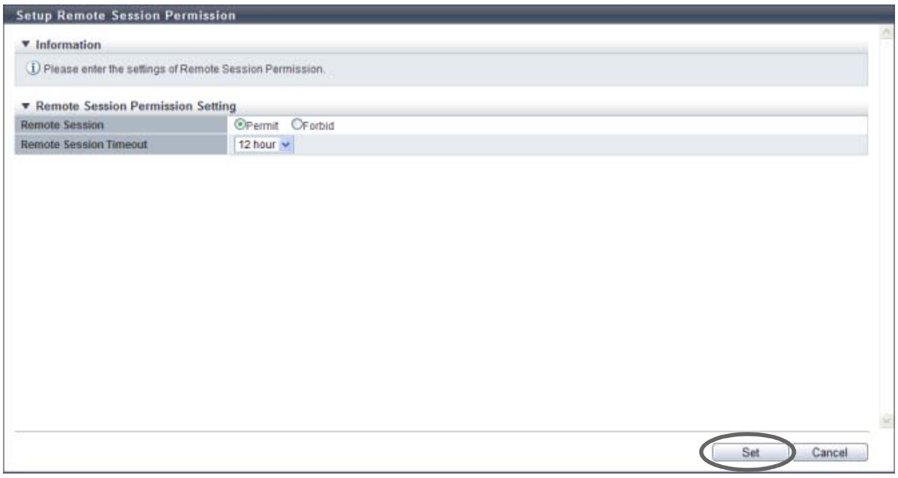
The procedure to set the remote support permission is as follows:

Procedure

1 Click [Setup Remote Session Permission] in [Action].

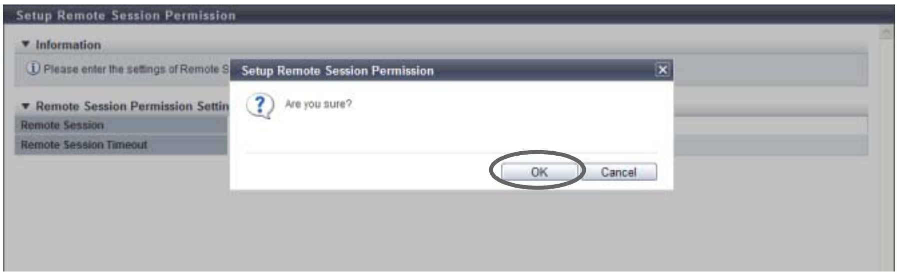
2 Specify the parameters, and click the [Set] button.

- Remote Session
  Select whether to permit or forbid a remote session from the AIS Connect server.
- Remote Session Timeout
  Select the timeout limit for remote session connection. When not setting the timeout limit, select "Unlimited".
  When "Permit" is selected for "Remote Session", monitoring of the remote sessions starts. If the time exceeds the specified value without a remote session connection, remote session permission is automatically disabled and the setting status changes to "Forbid". If a remote session connection is detected while monitoring is being performed, the timer is suspended during connection. After connection is complete, the timer is reset to "0" and monitoring starts again.
  Selecting the timeout limit is only available when "Permit" is selected for "Remote Session".
  - 1 - 24 hour
  - Unlimited



→ A confirmation screen appears.

3 Click the [OK] button.



→ The permission settings for remote session are applied.

4 Click the [Done] button to return to the screen when starting this function in Step 1.

End of procedure

11.2.5.3 Send Log

This function manually sends a storage system log to the remote server (AIS Connect server) when the AIS Connect function is in operation.

Caution

- Sending logs is only available when "AIS Connect" is enabled. Refer to "11.2.5.1 Setup AIS Connect Environment" (page 821) for details.
- Check the connection to the AIS Connect server in advance. Refer to "11.2.5.4 Test Server Connectivity" (page 828) for details. If a communication error occurs and a connection to the AIS Connect server cannot be established, logs cannot be sent. A log that fails to be sent is not resent.
- If a send log request is already performed once log collection is complete, send log requests are not performed.

Note

This function collects logs (including I/O Module logs) at the time when performing the [Send Log] function. Log files are divided into 640MB increments and sent to the AIS Connect server.

The procedure to send log is as follows:

Procedure

1 Click [Send Log] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ Sending log starts.

3 Click the [Done] button to return to the screen when starting this function in Step 1.

End of procedure

11.2.5.4 Test Server Connectivity

This function checks the connection status between the ETERNUS DX80 S2/DX90 S2, the ETERNUS DX410 S2/DX440 S2, or the ETERNUS DX8100 S2/DX8700 S2, and a remote server (AIS Connect server).

Caution

Checking the connection status is only available when "AIS Connect" is enabled. Refer to "11.2.5.1 Setup AIS Connect Environment" (page 821) for details.

Note

This function checks the connection status of the AIS Connect server by using the AIS Connect information in the ETERNUS DX Disk storage system. After using the [Setup AIS Connect Environment] function, use the [Test Server Connectivity] function to check the connection status.

The procedure to check the connection status between the ETERNUS DX Disk storage system and the AIS Connect server is as follows:

Procedure

1. Click [Test Server Connectivity] in [Action].

   → A confirmation screen appears.

2. Click the [OK] button.



   → Checking of the server connection status starts.

3. Click the [Done] button to return to the screen when starting this function in Step 1.

Note

The check result of the server connection status is displayed in the [Test Server Connectivity Result] screen. If server connection fails, the cause of the error is displayed.

End of procedure

11.2.5.5 Send AIS Connect Test Event

This function sends a test event to the remote server (AIS Connect server).

Caution

- Sending a test event is only available when "AIS Connect" is enabled. Refer to "11.2.5.1 Setup AIS Connect Environment" (page 821) for details.
- The [Send AIS Connect Test Event] function only sends an event. Note that this function cannot be used to check the network connection status between the ETERNUS DX Disk storage system and the AIS Connect server. Use the [Test Server Connectivity] function to check the connection status. After checking the connection status, use the [Send AIS Connect Test Event] function to send a test event. Check the AIS Connect server to confirm that the event is successfully received.

The procedure to send a test event to the AIS Connect server is as follows:

Procedure

1 Click [Send AIS Connect Test Event] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ Sending of the AIS Connect test event starts.

3 Click the [Done] button to return to the screen when starting this function in Step 1.

End of procedure

11.2.5.6 Import Root Certificate

This function updates the root certificate that is used for SSL communication with the AIS Connect server.
A root certificate file includes multiple certificates. The maximum file size of a root certificate is 12288 byte.

Caution

- A default root certificate is already registered in the ETERNUS DX Disk storage system. Check the expiration date of the default root certificate from the [Root Certificate] screen. The root certificate must be updated before the expiration date. This function overwrites the root certificate. Only the latest root certificate is saved in the ETERNUS DX Disk storage system.
- The root certificate cannot be updated when both the "AIS Connect" setting and the "SSL Server Certification" setting are enabled. To update the root certificate while the AIS Connect function is being used, temporarily disable the "AIS Connect" setting and then update the certificate. The current settings for "AIS Connect" and "SSL Server Certification" can be checked from the [AIS Connect] screen. Refer to "11.1.4 Remote Support (AIS Connect) for Regions other than Japan" (page 719) for details.

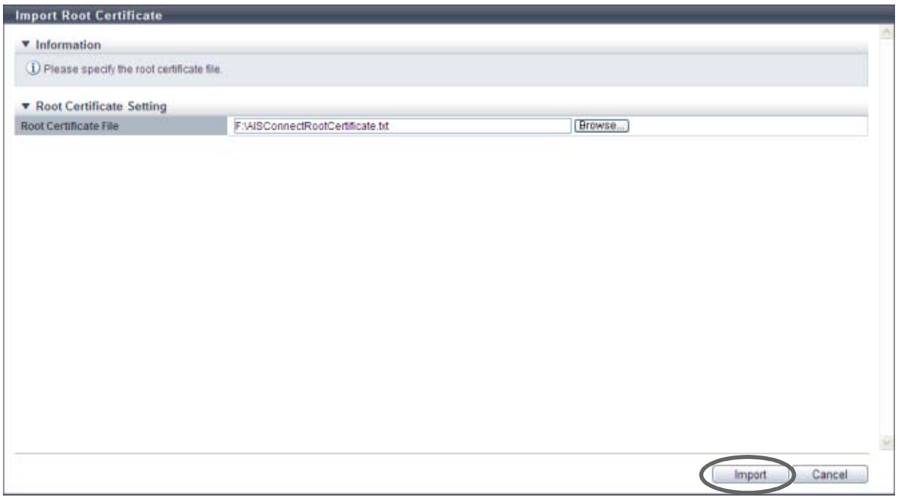
Note

- The root certificate is only used for authentication with the AIS Connect server.
- The expiration date of the updated root certificate can be checked from the [Root Certificate] screen. Refer to "11.1.4.1 Root Certificate" (page 721) for details.

The procedure to updates the root certificate is as follows:

Procedure

1. Click [Import Root Certificate] in [Action].
2. Specify the root certificate file and click the [Import] button.
   - Root Certificate File
     Click the [Browse...] button to specify the root certificate file, or directly input the path to the root certificate file.



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:
- When the imported file is not "root certificate file"
- When the imported file size exceeds 12288 bytes
- When both the "AIS Connect" setting and "SSL Server Certification" setting are enabled

3 Click the [OK] button.



→ Updating of the root certificate starts.

4 Click the [Done] button to return to the [Root Certificate] screen.

End of procedure

11.2.6 Key Management

This section describes key management.
In this section, the SED authentication key is referred to as "key".
Key management provides the following functions:

- Setup Key Management Machine Name
- Add Key Server
- Delete Key Server
- Modify Key Server
- Create Key Group
- Delete Key Group
- Modify Key Group
- Update SED Authentication Key
- Import SSL/KMIP Certificate

11.2.6.1 Required Settings for the Key Management Function

Security on preventing the leakage of information can be improved by storing the key for Self Encrypting Drive (SED) authentication in an external secure place (key server), and updating the key regularly.

■ Required settings for the key management function

This section describes preparation that needs to be performed before using the key management function, how to check the key status, and how to perform key group settings for RAID groups.
Perform the required settings in the following order.

● Preparation

(1) Register SED authentication key

Register the key (common key) that is managed in the ETERNUS DX Disk storage system.
Refer to "11.2.13.7 Register SED Authentication Key" (page 944) for details.

Caution

- If an SED is installed without registering the common key, rebooting the ETERNUS DX Disk storage system is required after registering the key.
- The common key setting cannot be changed or deleted.
- The "Register SED Authentication Key" function can only be used once. If an SED authentication key is already registered in the "Register SED Authentication Key" screen of the initial setup, this operation is not required. Use the [System Settings] screen to check whether the SED authentication key is already registered. Refer to "11.1.12 System Settings" (page 731) for details.

If the common key is used to manage all of the SEDs in the ETERNUS DX Disk storage system, the required settings for key management are complete.
To manage the key in the key server, perform the following procedures ("(2) Create self-signed SSL certificate" (page 832) onward).
RAID groups that use the common key and RAID groups that use the key in the key server (RAID groups that are registered in the key group) can be used in the same storage system.

(2) Create self-signed SSL certificate

To establish communication between the ETERNUS DX Disk storage system and the key server, create a self-signed SSL certificate as the SSL certificate of the ETERNUS DX Disk storage system.
Refer to "11.2.3.15 Create Self-signed SSL Certificate" (page 787).

Note

- Even if a self-signed SSL certificate has already been created and registered, perform the [Create Self-signed SSL Certificate] function again. Since the self-signed SSL certificate has changed, reregistration to the ETERNUS DX Disk storage system is required. Refer to "Appendix C Installing the Security Certificate" (page 981) for details.
- A "self-signed SSL certificate" or an "SSL server certificate" can be used as the SSL certificate of the ETERNUS DX Disk storage system. Refer to "11.2.3.16 Create Key/CSR" (page 790) and "11.2.3.17 Register SSL Certificate" (page 795) for details.

(3) Setup key management device name

Set the name (Key Management Machine Name) for the device that communicates with the key server.
Refer to "11.2.6.2 Setup Key Management Machine Name" (page 835).

(4) Add key server

Register the IP address or the domain name of the key server that manages the key. Up to two key servers can be registered in the ETERNUS DX Disk storage system.
Refer to "11.2.6.3 Add Key Server" (page 836).

Caution

Select a network port (MNT or RMT) that is specified in the [Setup Network Environment] function for the LAN port that is used to communicate with the key server.

(5) Create key group

Create a key group. The key group combines all of the RAID groups that use the same key. Only one key group can be created in the ETERNUS DX disk storage system.
Refer to "11.2.6.6 Create Key Group" (page 841).

(6) Import SSL/KMIP certificate

Register the SSL/KMIP certificate that is exported from the key server in the ETERNUS DX Disk storage system.
Refer to "11.2.6.10 Import SSL/KMIP Certificate" (page 851).

Note

For details on how to export the SSL/KMIP certificate, refer to the manuals of the key management software "ETERNUS SF KM".

(7) Update SED authentication key

Obtain the key that is to be registered in the key group from the key server.
Refer to "11.2.6.9 Update SED Authentication Key" (page 849).

Caution

When the [Update SED Authentication Key] function is performed at the first time, the process ends with an error. Use the [Update SED Authentication Key] function until the key is successfully obtained. When the key is successfully obtained, the key server status becomes "Normal". Up to three key updating processes may need to be performed. The [Update SED Authentication Key] ends with an error until the key is obtained.

- When the key updating function is used for the first time, the ETERNUS DX Disk storage system sends the SSL certificate to the key server. The key server waits for the SSL certificate to be registered. Register the SSL certificate in the key server.
- When the key updating function is used for the second time, the key server waits for the ETERNUS DX Disk storage system to be accessed.
- When the key updating function is used for the third time, the ETERNUS DX Disk storage system can obtain the key from the key server.

The key server status can be checked on the [Key Group] screen. Refer to "11.1.5.1 Key Group" (page 723) for details.

Note

For details on how to register the SSL certificate and accept the ETERNUS DX Disk storage system, refer to the manuals of the key management software "ETERNUS SF KM".

- Check key status

(1) Key group
Check the communication status between the ETERNUS DX Disk storage system and the key server. If the key status and the key server status are "Normal", communication between the ETERNUS DX Disk storage system and the key server has been successfully established.
Refer to "11.1.5.1 Key Group" (page 723).

- Key group settings for the RAID group

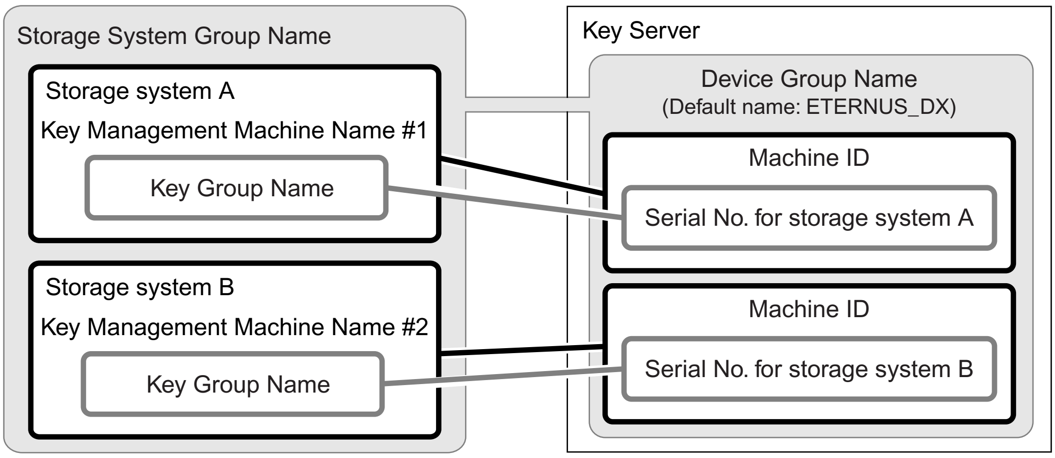
(1) Set key group
Register any RAID groups that use the same key from the key server in the key group.
Refer to "6.2.8 Set Key Group (RAID Group)" (page 195).

(2) SED key group
Check the key group setting status of the RAID group.
Refer to "6.1.4 SED Key Group" (page 167).

Relation between the ETERNUS DX Disk storage system and the key server

The following figure shows the relation between the ETERNUS DX Disk storage system and the key server.

Figure 11.1 Relation between the ETERNUS DX Disk storage system and the key server



The ETERNUS DX Disk storage system obtains the key from the key server by using the "Storage System Group Name", "Key Management Machine Name", and "Key Group Name" as the password.

11.2.6.2 Setup Key Management Machine Name

This function specifies the name of the key management device (Key Management Machine).
The key management device name is used for the device that is to be used to connect to the key server.

Caution

The key management device name cannot be specified when a common key (*1) is not registered. Refer to "11.2.13.7 Register SED Authentication Key" (page 944) for details.

*1: The common key for SEDs that are managed in the ETERNUS DX Disk storage system.

The procedure to set the key management device name is as follows:

Procedure

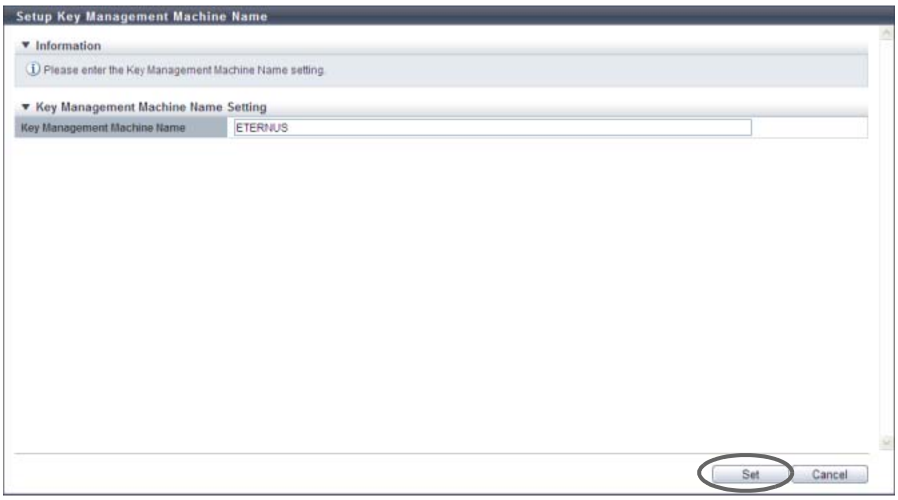
1 Click [Setup Key Machine Name] in [Action].

2 Specify the key management device name, and click the [Set] button.

- Key Management Machine Name
  Input the name of the device that is to be used to connect to the key server.
  The key management device name corresponds to "Machine ID" in the key server.
  The following input conditions apply:
  - Up to 48 alphanumeric characters and symbols (underscore "_")
  - The first letter must be an alphabetic character

Caution

Do not change the key management device name after the key status changes to "Normal". The key status can be checked on the [Key Group] screen. Refer to "11.1.5.1 Key Group" (page 723) for details.

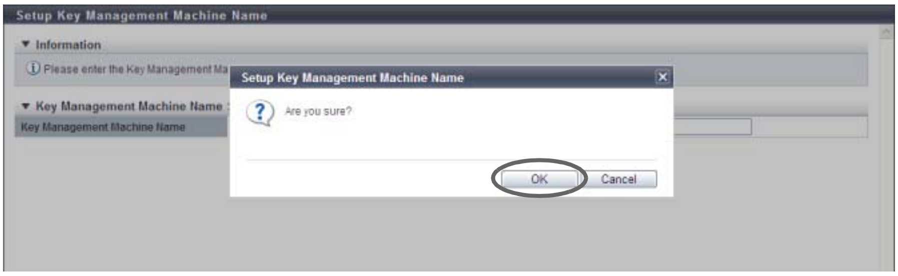


→ A confirmation screen appears.

Caution

If the entered "Key Management Machine Name" does not satisfy the input conditions, an error screen appears.

3 Click the [OK] button.



→ Setting of the key management device name starts.

4 Click the [Done] button to return to the [Key Management] screen.

End of procedure

11.2.6.3 Add Key Server

This function adds a key server.
A key server is an external server that manages the key. By using the key server to obtain and update the key via SSL to establish secure communication with the ETERNUS DX Disk storage system, an environment in which the key can be managed more safely can be created. Up to two key servers can be registered.
For the key server, use a server in which "ETERNUS SF KM" (key management software that applies the Key Management Interoperability Protocol (KMIP)), is installed. Note that "IBM Tivoli Key Lifecycle Manager" is also available as the key management software.

Caution

- The key server cannot be added when the common key (*1) is not registered. Refer to "11.2.13.7 Register SED Authentication Key" (page 944) for details.

*1: The common key for SEDs that are managed in the ETERNUS DX Disk storage system.

- By using a key server to manage the key, the ETERNUS DX Disk storage system can obtain the key from the key server when required. For example, the key is obtained when RAID groups are added to the key group or when maintenance is performed for SEDs that configure a RAID group in the key group. Make sure that communication is always maintained between the ETERNUS DX Disk storage system and the key server. To obtain the key from a key server, the key server must respond to the ETERNUS DX Disk storage system within 30 seconds. Do not use the key server function in an environment in which a network timeout may occur.

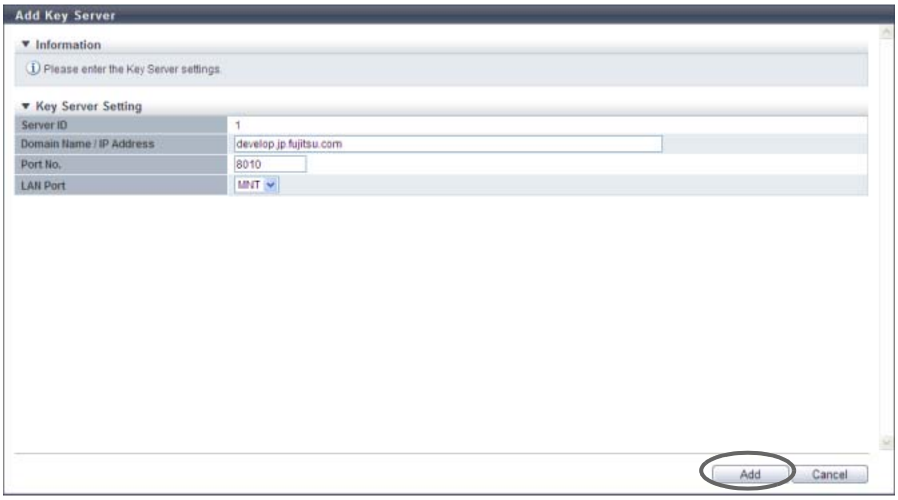
The procedure to add a key server is as follows:

Procedure

1 Click [Add Key Server] in [Action].

2 Specify the parameters, and click the [Add] button.

- Server ID
  "1" or "2" is displayed as the ID for unregistered servers. When a key server is registered for "1", "2" is displayed.
  The server ID for the master or the slave server is specified when creating the key group. Refer to "11.2.6.6 Create Key Group" (page 841) for details.
- Domain Name / IP Address
  Input the domain name (FQDN) or the IP address of the key server.
  There are two methods to specify an IP address; "IPv4" and "IPv6". The following IPv6 addresses can be used; "link local address", "global address", "unique local address", and "6to4 address". Refer to "Available IPv6 Address" (page 757) for details.
  When the current setting is displayed, the IPv6 address is displayed as an abbreviation.
  The following input conditions apply:
  - For "Domain Name"
    Up to 63 alphanumeric characters and symbols
  - For IPv4 address
    xxx.xxx.xxx.xxx
    xxx: 1 - 255 for the top field (decimal)
    xxx: 0 - 255 for other fields (decimal)
  - For IPv6 address
    xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
    Refer to "IPv6 Address Notation (Setup Network Environment)" (page 757) for details.
- Port No.
  Input the port number used to communicate with the key server.
  The following input conditions apply:
  - Numeric characters
  - 1 - 65535
- LAN Port
  Select "MNT" or "RMT" for the LAN port that is to be used to communicate with the key server.



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When each parameter fails to satisfy the input conditions
- When inputting a domain name or an IP address that is already used for another key server
- When the IP address that was input and the IP address of the LAN port (MNT or RMT) are the same
- When the IP address that was input and the network address of the LAN port (MNT or RMT)are the same

3 Click the [OK] button.



→ Adding of the key server starts.

4 Click the [Done] button to return to the [Key Management] screen.

End of procedure

11.2.6.4 Delete Key Server

This function deletes key servers.

Caution

A key server that is allocated to a key group cannot be deleted. Refer to the "Master Server" field and the "Slave Server" field in the [Key Group] screen to check whether the key server is allocated to the key group. Refer to "11.1.5.1 Key Group" (page 723) for details.

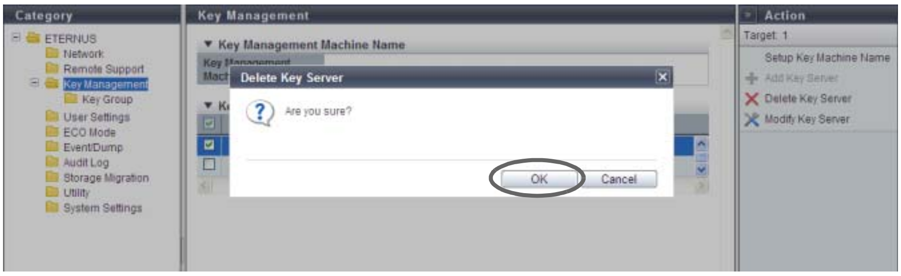
The procedure to delete key servers is as follows:

Procedure

1 Select the key server that is to be deleted (multiple selections can be made) and click [Delete Key Server] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ Deleting of the key server starts.

3 Click the [Done] button to return to the [Key Management] screen.

End of procedure

11.2.6.5 Modify Key Server

This function changes the key server settings.

Note

- Key server settings that are allocated to a key group can be changed.
- This function can be used to change "Domain Name / IP Address", "Port No.", and "LAN Port".
- This function can be used even when operations are being performed for the volumes that configures a key management target RAID group.

The procedure to change the key server settings is as follows:

Procedure

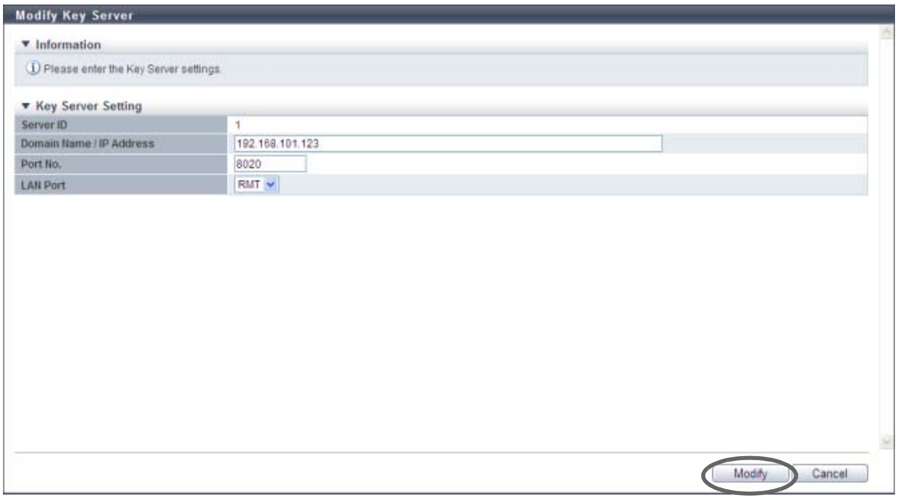
1 Select the key server that is to be changed and click [Modify Key Server] in [Action].

2 Specify the parameters, and click the [Modify] button.

- Domain Name / IP Address
  Input the domain name (FQDN) or the IP address of the key server.
  There are two methods to specify an IP address; "IPv4" and "IPv6". The following IPv6 addresses can be used; "link local address", "global address", "unique local address", and "6to4 address". Refer to "Available IPv6 Address" (page 757) for details.
  When the current setting is displayed, the IPv6 address is displayed as an abbreviation.
  The following input conditions apply:
  - For "Domain Name"
    Up to 63 alphanumeric characters and symbols
  - For IPv4 address
    xxx.xxx.xxx.xxx
    xxx: 1 - 255 for the top field (decimal)
    xxx: 0 - 255 for other fields (decimal)

- For IPv6 address
  xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
  xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
  Refer to "IPv6 Address Notation (Setup Network Environment)" (page 757) for details.

- Port No.
  Input the port number used to communicate with the key server.
  The following input conditions apply:
  - Numeric characters
  - 1 - 65535
- LAN Port
  Select "MNT" or "RMT" for the LAN port that is to be used to communicate with the key server.



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:
- When each parameter fails to satisfy the input conditions
- When inputting a domain name or an IP address that is already used for another key server
- When the IP address that was input and the IP address of the LAN port (MNT or RMT) are the same
- When the IP address that was input and the network address for the LAN port (MNT or RMT) are the same

3 Click the [OK] button.



→ Changing of the key server settings starts.

4 Click the [Done] button to return to the [Key Management] screen.

End of procedure

11.2.6.6 Create Key Group

This function creates a key group.
The key group combines all of the RAID groups that use the same key. One key group can be created in the ETERNUS DX Disk storage system.

Caution

The key group cannot be created when a common key (*1) is not registered. Refer to "11.2.13.7 Register SED Authentication Key" (page 944) for details.

*1: The common key for SEDs that are managed in the ETERNUS DX Disk storage system.

Note

- The key group can be created even when the key server is not registered.
- The key group can be created even when communication with the key server is not available.
- Register RAID groups that use the same key in the key group. Refer to "6.2.8 Set Key Group (RAID Group)" (page 195) for details.
- The RAID groups that are registered in the key group can be checked by using the [SED Key Group] screen. Refer to "6.1.4 SED Key Group" (page 167) for details.
- There are two types of SED keys: a common key and a key that is managed in the key server. RAID groups that use the common key and RAID groups that use the key managed in the key server (RAID groups that are registered in the key group) can be created in the same storage system.

The procedure to create a key group is as follows:

Procedure

1 Click [Create Key Group] in [Action].

2 Specify the parameters, and click the [Create] button.

- Name
  Input a key group name.
  The key group name corresponds to "Serial Number", which is managed in the key server.
  The following input conditions apply:
  - Up to 32 alphanumeric characters and symbols (underscore "_")
  - The first letter must be an alphabetic character

  Caution

  - Specify a unique key group name that is different from the other storage systems that use the same key server.
  - Do not change the key group name after the key status changes to "Normal". The key status can be checked on the [Key Group] screen. Refer to "11.1.5.1 Key Group" (page 723) for details.

- Storage System Group Name
  Input the storage system group name.
  The storage system group combines the key management device (Key Management Machine) name that is managed by the user with the key groups. The storage system group name corresponds to "Device Group Name", which is managed in the key server. If the default setting is used, input "ETERNUS_DX". Note that "ETERNUS_DX" is specified as the default device group name when an ETERNUS DX Disk storage system is shipped with "ETERNUS SF KM" (key management software).
  The following input conditions apply:
  - Up to 16 alphanumeric characters and symbols (underscore "_")
  - The first letter must be an alphabetic character
  - "ETERNUS_DX" (When using the default setting)

  Caution

  - For the storage system group name, specify the same name as "Device Group Name", which is registered in the key server.
  - Do not change the storage system group name after the key status changes to "Normal". The key status can be checked on the [Key Group] screen. Refer to "11.1.5.1 Key Group" (page 723) for details.

- Security Level
  Select the security level of the key group from "High" or "Low".
  "Security Level" indicates the handling level when application of the SED key to the target RAID group fails. If the key for the relevant RAID group cannot be obtained from the key server due to a communication error and the SEDs that configure the RAID group are changed to hot spares or changed to new SEDs due to failure or maintenance, the ETERNUS DX Disk storage system performs operations according to the selected security level.
  - High
    Rebuilding to hot spares for which the key cannot be changed after SED failure is not performed. The RAID group loses its redundancy (" Exposed" or " Partially Exposed" (for High Reliability (RAID6))).
    When SED maintenance is being performed, replacing a SED with a new SED for which the key cannot be changed does not complete successfully. If this action is performed, the status of the new SED changes to " Not Exist".
    When communication between the key server and the ETERNUS DX Disk storage system returns to normal and the key can be obtained, the SED status changes to normal. Rebuilding to the SED for which the status changed to normal is performed after the key is changed. Note that "Modifying" may be displayed for the key status for few minutes even though the SED key has already changed. After changing the key, maintenance of the SEDs is complete.
  - Low
    Rebuilding or maintenance is performed by using the common key if changing of the key in the key server fails due to a network error.

  Even if the security level is changed from "High" to "Low", the rebuilding process does not start immediately after the level is changed. Rebuilding processes start after the ETERNUS DX Disk storage system recognizes that changing of the security level and the key is complete.

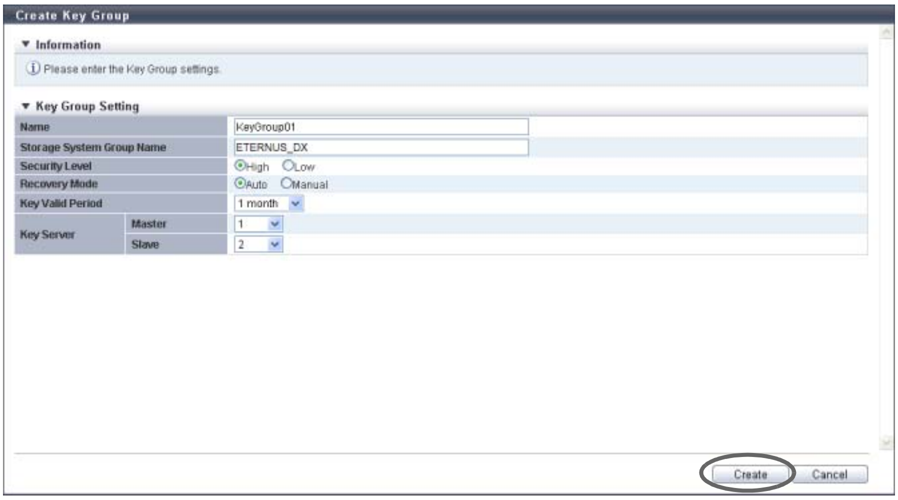
- Recovery Mode
  Select the recovery mode of the key group from "Auto" or "Manual".
  The recovery mode is a method to recover locked (*1) RAID groups or SEDs after communication with the key server is resolved. For RAID groups in locked status, " SED Locked" is displayed. For SEDs in locked status, " Not Exist" is displayed.
  *1: A blocked status that occurs when the key of the RAID groups cannot be obtained.
  - Auto
    This mode recovers locked RAID groups or SEDs when the communication error with the key server is resolved.
  - Manual
    Use the [Recovery SED] function of GUI to recover the locked RAID groups or SEDs when the communication error with the key server is resolved.

- Key Valid Period
  Select a key expiration period that is based on the date when the key from the server is obtained for the first time (beginning of use).
  When the key expires, a new key is obtained from the key server and the expired key is automatically replaced. The key expiration period is checked every eight hours.
  - Unlimited
    The same key is used until exactly 20 years elapses since the key was first used.
  - 1 month - 12 month
    The same key is used until the date and time in the specified month elapses since the key was first used. If the same date does not exist in the specified month (such as April 31st), the expiration date of the key becomes the last date of the specified month.

- Key Server
  - Master
  - Slave
    Select the key server ID that is assigned for the master or slave server. "None" and the registered key server ID are displayed as options.
    - None
    - 1
    - 2

Caution

- The same server ID (except for "None") cannot be selected for both the master and slave servers.
- The key can only be updated when the master server is specified. Refer to "11.2.6.9 Update SED Authentication Key" (page 849) for details.



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When the "Name" is not entered
- When the "Storage System Group Name" is not entered
- When each parameter fails to satisfy the input conditions
- When the same server ID is specified for both the master and slave servers

3 Click the [OK] button.



→ Key group creation starts.

4 Click the [Done] button to return to the [Key Group] screen.

End of procedure

11.2.6.7 Delete Key Group

This function deletes the key group.

Caution

A key group in which RAID groups are registered cannot be deleted. Use the [SED Key Group] screen to check whether RAID groups are registered in the key group. Refer to "6.1.4 SED Key Group" (page 167) for details.

The procedure to delete a key group is as follows:

Procedure

1 Click [Delete Key Group] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ Deleting of the key group starts.

3 Click the [Done] button to return to the [Key Group] screen.

End of procedure

11.2.6.8 Modify Key Group

This function changes the key group settings.
The key group combines all of the RAID groups that use the same key.

The procedure to change the key group settings is as follows:

Procedure

1 Click [Modify Key Group] in [Action].

2 Specify the parameters, and click the [Modify] button.

- Name
  Input a key group name.
  The key group name corresponds to "Serial Number", which is managed in the key server.
  The following input conditions apply:
  - Up to 32 alphanumeric characters and symbols (underscore "_")
  - The first letter must be an alphabetic character

> **Caution**
>
> Do not change the key group name after the key status changes to "Normal". The key status can be checked on the [Key Group] screen. Refer to "11.1.5.1 Key Group" (page 723) for details.

- Storage System Group Name
  Input the storage system group name.
  The storage system group combines the key management device (Key Management Machine) name that is managed by the user with the key groups. The storage system group name corresponds to "Device Group Name", which is managed in the key server.
  The following input conditions apply:
  - Up to 16 alphanumeric characters and symbols (underscore "_")
  - The first letter must be an alphabetic character

  Caution

  Do not change the storage system group name after the key status changes to "Normal". The key status can be checked on the [Key Group] screen. Refer to "11.1.5.1 Key Group" (page 723) for details.

- Security Level
  Select the security level of the key group from "High" or "Low".
  "Security Level" indicates the handling level when application of the SED key to the target RAID group fails. If the key for the relevant RAID group cannot be obtained from the key server due to a communication error and the SEDs that configure the RAID group are changed to hot spares or changed to new SEDs due to failure or maintenance, the ETERNUS DX Disk storage system performs operations according to the selected security level.
  - High
    Rebuilding to hot spares for which the key cannot be changed after SED failure is not performed. The RAID group loses its redundancy (" Exposed" or " Partially Exposed" (for High Reliability (RAID6))).
    When SED maintenance is being performed, replacing a SED with a new SED for which the key cannot be changed does not complete successfully. If this action is performed, the status of the new SED changes to " Not Exist".
    When communication between the key server and the ETERNUS DX Disk storage system returns to normal and the key can be obtained, the SED status changes to normal. Rebuilding to the SED for which the status changed to normal is performed after the key is changed. Note that "Modifying" may be displayed for the key status for few minutes even though the SED key has already changed. After changing the key, maintenance of the SEDs is complete.
  - Low
    Rebuilding or maintenance is performed by using the common key if changing of the key in the key server fails due to a network error.

  Even if the security level is changed from "High" to "Low", the rebuilding process does not start immediately after the level is changed. Rebuilding processes start after the ETERNUS DX Disk storage system recognizes that changing of the security level and the key is complete.
- Recovery Mode
  Select the recovery mode of the key group from "Auto" or "Manual".
  The recovery mode is a method to recover locked (*1) RAID groups or SEDs after communication with the key server is resolved. For RAID groups in locked status, " SED Locked" is displayed. For SEDs in locked status, " Not Exist" is displayed.
  *1: A blocked status that occurs when the key of the RAID groups cannot be obtained.

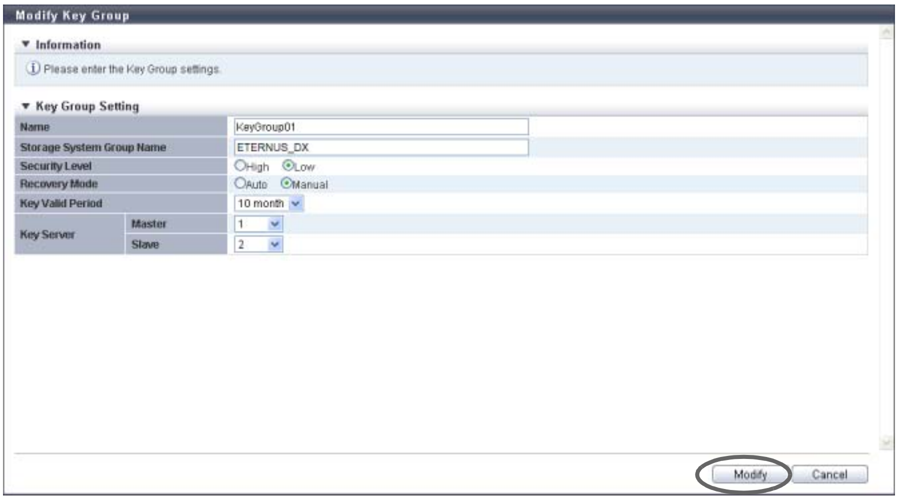
- Auto
  This mode recovers locked RAID groups or SEDs when the communication error with the key server is resolved.
- Manual
  Use the [Recovery SED] function of GUI to recover the locked RAID groups or SEDs when the communication error with the key server is resolved.

- Key Valid Period
  Select a key expiration period that is based on the date when the key from the server is obtained for the first time (beginning of use).
  When the key expires, a new key is obtained from the key server and the expired key is automatically replaced. If the key expiration period is changed, the same key is used from the first date of use until the key expired. Note that the "first date" indicates the first day of use instead of the first day of the key changed.
  - Unlimited
    The same key is used until exactly 20 years elapses since the key was first used.
  - 1 month - 12 month
    The same key is used until the date and time in the specified month elapses since the key was first used. If the same date does not exist in the specified month (such as April 31st), the expiration date of the key becomes the last date of the specified month.

- Key Server
  - Master
  - Slave
    Select the key server ID that is assigned for the master or slave server. "None" and the registered key server ID are displayed as options.
    - None
    - 1
    - 2

Caution

- The same server ID (except for "None") cannot be selected for both the master and slave servers. Note that "None" cannot be selected for both of the servers when RAID groups are registered in the key group.
- The key can only be updated when the master server is specified. Refer to "11.2.6.9 Update SED Authentication Key" (page 849) for details.
- To perform maintenance of the key server, the key server setting parameters must be released temporality. Select "None" for the target key server before starting maintenance. After maintenance is complete, set the key server parameters again.



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When the "Name" is not entered
- When the "Storage System Group Name" is not entered
- When each parameter fails to satisfy the input conditions
- When the same server ID is specified for both the master and slave servers
- When "None" is selected for both of the servers (master and slave) while RAID groups are registered in the key group

3 Click the [OK] button.



→ Changing of the key group settings starts.

4 Click the [Done] button to return to the [Key Group] screen.

End of procedure

11.2.6.9 Update SED Authentication Key

This function updates the key in the key group. Updating of the key is performed in the following ways:

- When no key is registered in the key group, a key that has not expired is obtained from the key server.
- When the key is valid and has not expired, this key is replaced with a new key from the key server.

The ETERNUS DX Disk storage system monitors the key on a regular basis and automatically replaces an expired key with a new key. This function is used when a new key is required before the key expiration date has been reached because the user loses the SEDs that were disconnected for maintenance. This function asks whether to use the current key again when replacing the key.

Caution

- Replacing a key is only available when the master server is registered. Check the registration status of the master server in the [Key Group] screen. To replace the key, register the master server in advance. Refer to "11.2.6.8 Modify Key Group" (page 845) for details.
- The key is updated only when communication with the master server is normal.
- If no key is registered in the key group, an error occurs when the first update of the key is performed. In this case, register the SSL certificate of the ETERNUS DX Disk storage system in the key server, accept access from the ETERNUS DX Disk storage system, and then update the key again. The key status changes to "Normal". An SSL certificate of the ETERNUS DX Disk storage system indicates a "self-signed SSL certificate" or an "SSL server certificate".
- The key can only be updated when the SEDs that configure the RAID groups in the key group are in the normal status. If there are SEDs without normal status in the RAID group, make sure to perform maintenance for these SEDs in advance. If the key is updated before required maintenance is performed for the SEDs, the RAID group status changes to " Exposed" and updating of the key for the RAID group is not complete (the key status of the key group is not changed from "Modifying"). Updating of the key is complete after performing the SED maintenance and the status of all the RAID groups has returned to " Available" (the key status of the key group has changed to "Normal").
- If the RAID groups in the key group are blocked (the status is " SED Locked"), the RAID group status is not changed to " Available" even after the key is updated. Make sure to recover SEDs before updating the key. Refer to "6.2.9 Recovery SED" (page 197) for details.
- When "Disabled Key" is selected for "Current Key", make sure to compromise (*1) the key in the key server by using CLI for the key server. Note that GUI for the key server does not support the key compromising function.

*1: The key becomes unavailable in the key server.

Note

- This function can be used to replace a key when the expiration date of the key is set to "Unlimited".
- This function can also be used to update the key in a key group in which no RAID groups are registered.

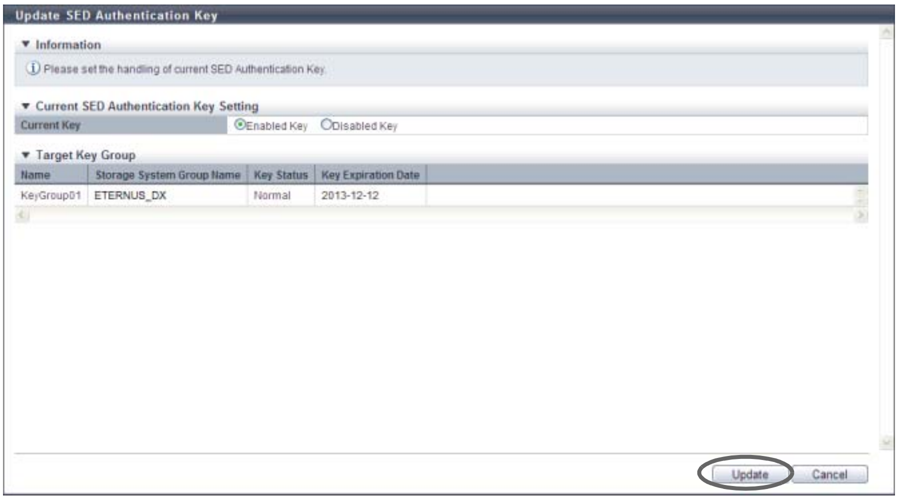
The procedure to update a key in the key group is as follows:

Procedure

1 Click [Update SED Key] in [Action].

2 Select whether to use the current key again, and then click the [Update] button.

- Current Key
  Select whether to enable ("Enabled Key") or disable ("Disabled Key") the current key.
  - Enabled Key
  - Disabled Key



→ A confirmation screen appears.

3 Click the [OK] button.



→ Updating of the SED Authentication Key starts.

Caution

An error screen appears in the following conditions:

- When the master server for the key group is not registered
- When one of the following statuses applies to the key in the key group:
  - Unregistered Server Certificate
  - Expired Server Certificate
  - No SSL Certificate
  - Network Error
  - Key Server Error

4 Click the [Done] button to return to the [Key Group] screen.

End of procedure

11.2.6.10 Import SSL/KMIP Certificate

This function registers the SSL/KMIP certificate in the ETERNUS DX Disk storage system. The SSL/KMIP certificate is used for communication with the key server.
When performing management of the key in the key server, communication between the key server and the ETERNUS DX80 S2/DX90 S2, the ETERNUS DX410 S2/DX440 S2, or the ETERNUS DX8100 S2/DX8700 S2 is required. To establish communication, register the "SSL/KMIP certificate" (a reliable certificate of the key server) in the ETERNUS DX Disk storage system.

Caution

The SSL/KMIP certificate cannot be registered when a common key (*1) is not specified. Refer to "11.2.13.7 Register SED Authentication Key" (page 944) for details.

*1: The common key for SEDs that are managed in the ETERNUS DX Disk storage system.

Note

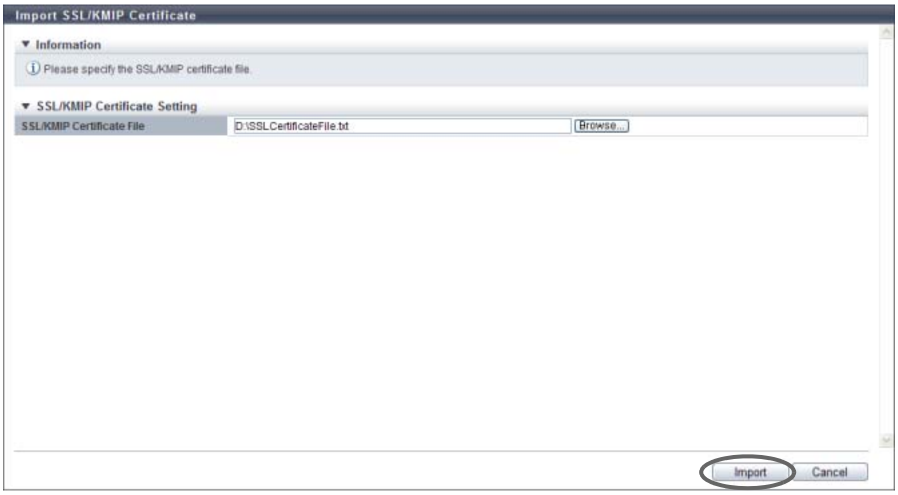
- Export the SSL/KMIP certificate from the key server and register this certificate in the ETERNUS DX Disk storage system.
- To establish communication between the key server and the ETERNUS DX Disk storage system, the SSL certificate of the storage system is also required. Refer to "11.2.3.15 Create Self-signed SSL Certificate" (page 787) or "11.2.3.16 Create Key/CSR" (page 790) for details.
- The SSL / KMIP certificate can be registered even when the key server is not specified.
- The SSL / KMIP certificate can be registered even when the key group is not created.

The procedure to register the SSL/KMIP certificate is as follows:

Procedure

1. Click [Import SSL/KMIP Certificate] in [Action].
2. Click the [Browse...] button to specify the path to the "SSL/KMIP Certificate File".
    - SSL/KMIP Certificate File
      Click the [Browse...] button to specify the SSL/KMIP certificate file, or directly input the path to the SSL/KMIP certificate file.

3 Click the [Import] button.



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When reading of the "SSL / KMIP Certificate" failed
- When the "SSL / KMIP Certificate" file is larger than 4096 bytes

4 Click the [OK] button.



→ Importing of the SSL/KMIP certificate starts.

Caution

When the imported file was not the "SSL/KMIP Certificate File", an error screen appears.

5 Click the [Done] button to return to the [Key Group] screen.

End of procedure

11.2.7 Define Role

This section describes user management.
User management provides the following functions:

- Setup User Account
- Initialize User Account
- Modify RADIUS
- Add Role
- Delete Role
- Modify Role

11.2.7.1 Setup User Account

This function adds, edits, and deletes the user account.

Caution

- Up to 60 user accounts can be set.
- When using the SSH Client Key authentication, create a pair of the SSH client public key and the SSH client secret key in advance, using the creation tool. One public key can be registered per user account. When the [Setup User Account] function is executed, the public key is registered in the ETERNUS DX Disk storage system.
- The following types (formats) of public keys can be used:
  - RSA for SSH1 (OpenSSH)
  - DSA for SSH2 (IETF)
  - RSA for SSH1 (IETF)

  The supported maximum encryption strength for the public key is 4096-bit.
- "User Name" for user accounts cannot be changed.
- The current user account (your account) can be changed or deleted. When deleting a user account, at least one user account with administrator privileges (role of "Admin") added must remain. Changed or deleted settings become available at the next login.
- The last user account with administrator privileges (role of "Admin") added cannot be deleted.

Note

- For a user account, the following items can be changed: "New Password", "User Role", whether to enable or disable "Account", and whether to register "SSH Public Key" or not.
- When a user account is deleted, the SSH client public key registered in the ETERNUS DX Disk storage system is also deleted.
- To initialize a user account, use the procedure in "11.2.7.2 Initialize User Account" (page 860). When a user account is initialized, the password for the default account can be initialized.
- To change the current user's (your) password, use the procedure in "11.2.1 Change User Password" (page 742).
- When RADIUS Authentication is used for login, the current user's (your) password cannot be changed.

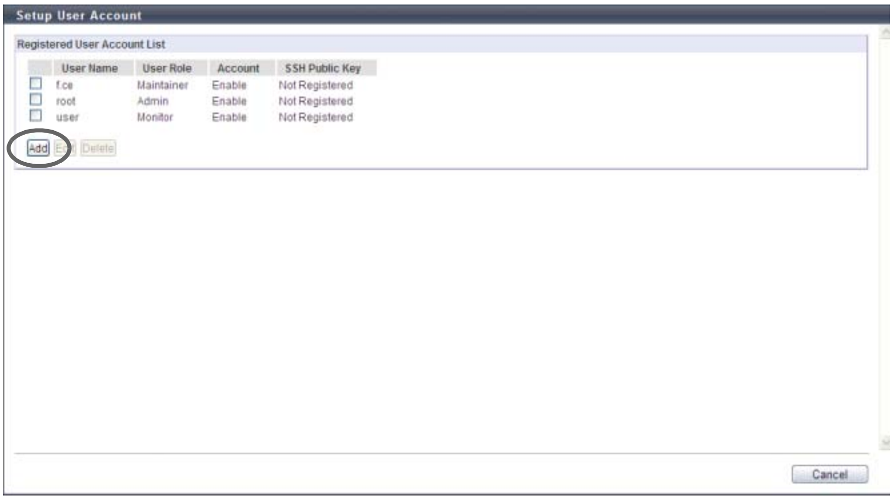
Add User Account

The procedure to add a user accounts is as follows:

Procedure

1 Click [Setup User Account] in [Action].

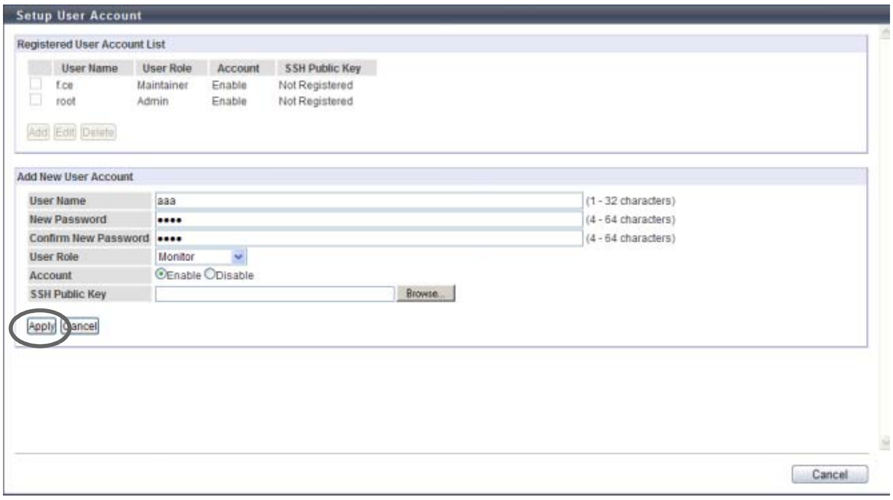
2 Click the [Add] button.



3 Specify the parameters, and click the [Apply] button.

- User Name
  Input a user name.
  An existing user name cannot be used. Entered letters are case-sensitive.
  The following input condition applies:
  - Up to 32 alphanumeric characters and symbols ('!', '-', '_', '.')
- New Password
  Input a password.
  Entered letters are case-sensitive.
  The following input condition applies:
  - 4 - 64 alphanumeric characters and symbols ('!', '-', '_', '.')
- Confirm New Password
  Input the same character string as the value entered in the "New Password" field for confirmation.

- User Role
  Select the user role to be added to the user name.
  The default and custom roles registered in the ETERNUS DX Disk storage system are displayed as the options.
  - Monitor
  - Admin
  - StorageAdmin
  - AccountAdmin
  - SecurityAdmin
  - Maintainer
  - Software
  - Custom role
- Account
  Select whether to "Enable" or "Disable" the user account.
  If the user account is disabled, that user account is registered but cannot be used.
- SSH Public Key
  Register the SSH client public key used for login authentication from CLI in the ETERNUS DX Disk storage system.
  Click the [Browse...] button and specify the public key to be registered.
  When using the SSH client key authentication, register the SSH public key in the ETERNUS DX Disk storage system and prepare the SSH secret key, corresponding to the public key in the client PC in advance.

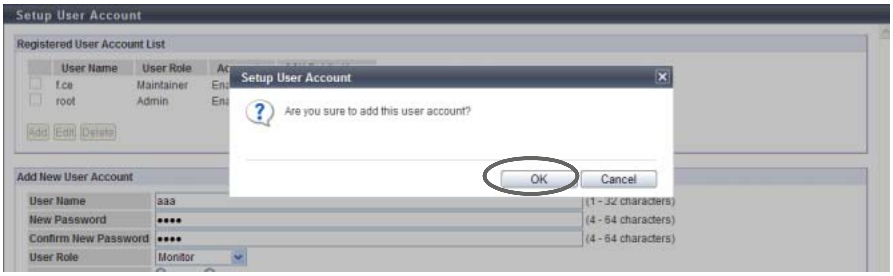


→ A confirmation screen appears.

Caution

- "Software" is the dedicated role that is used for external software. A user account with the "Software" role cannot log in to GUI.
- An error screen appears in the following conditions:
  - When a parameter does not satisfy the input conditions
  - When the user name is already registered
  - When "User Name", "New Password" and/or "Confirm New Password" is not input
  - When "New Password" does not match "Confirm New Password"

4 Click the [OK] button.



→ The user account setup starts.

5 Click the [Done] button to return to the [Define Role] screen.

End of procedure

Edit User Account

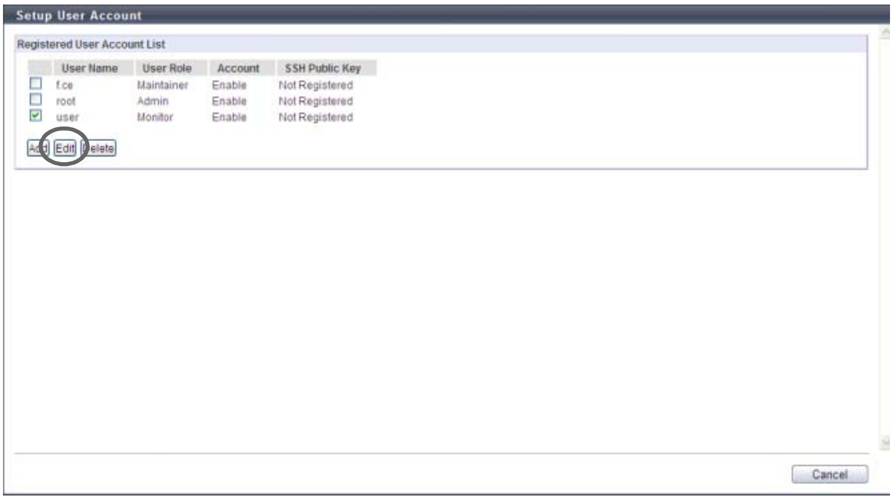
The procedure to edit a user accounts is as follows:

Procedure

1 Click [Setup User Account] in [Action].

2 Select the user account to be modified and click the [Edit] button.

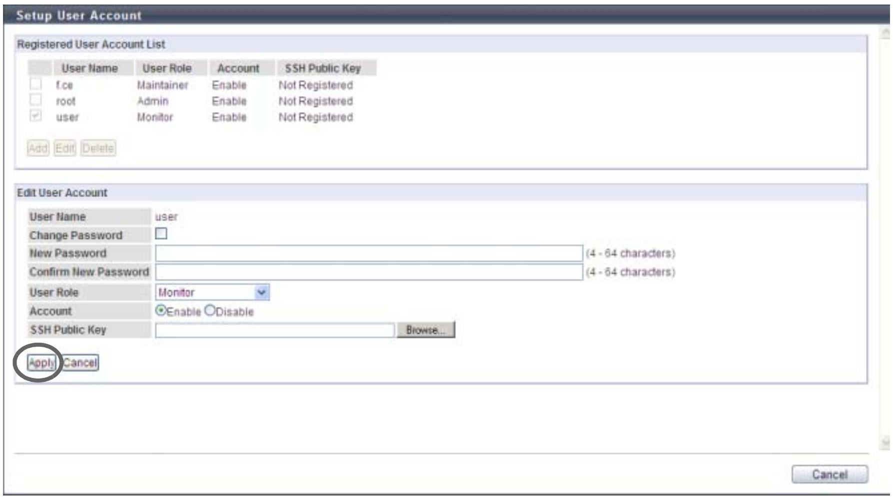
- Checkbox
  Select the checkbox for the user account to be modified.



3 Change the parameters, and click the [Apply] button.

● Edit User Account

- Change Password
  Only when changing the password, select the "Change Password" checkbox.
  When the "Change Password" checkbox is selected, enter a new password in "New Password" and "Confirm New Password".
- New Password
  Input a new password.
  Entered letters are case-sensitive.
  The following input condition applies:
  - 4 - 64 alphanumeric characters and symbols ('!', '-', '_', '.')
- Confirm New Password
  Input the same character string as the value entered in the "New Password" field for confirmation.
- User Role
  Select the user role to be added to the user name.
  The default and custom roles registered in the ETERNUS DX Disk storage system are displayed as the options.
  - Monitor
  - Admin
  - StorageAdmin
  - AccountAdmin
  - SecurityAdmin
  - Maintainer
  - Software
  - Custom role
- Account
  Select whether to "Enable" or "Disable" the user account.
  If the user account is disabled, that user account is registered but cannot be used.
- SSH Public Key
  Register the SSH client public key used for login authentication from CLI in the ETERNUS DX Disk storage system.
  Click the [Browse...] button and specify the public key to be registered.
  When using the SSH Client Key authentication, register the SSH public key in the ETERNUS DX Disk storage system and prepare the SSH secret key, corresponding to the public key in the client PC in advance.

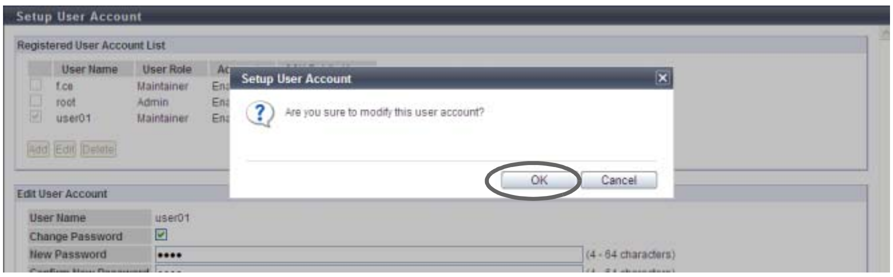


→ A confirmation screen appears.

Caution

- "Software" is the dedicated role that is used for external software. A user account with the "Software" role cannot log in to GUI.
- To change the password, select the "Change Password" checkbox.
- An error screen appears in the following conditions:
  - When a parameter does not satisfy the input conditions
  - When the "Change Password" checkbox is selected and "New Password" and/or "Confirm New Password" is not input
  - When the "Change Password" checkbox is selected and "New Password" does not match "Confirm New Password"

4 Click the [OK] button.



→ The user account setup starts.

5 Click the [Done] button to return to the [Define Role] screen.

End of procedure

Delete User Account

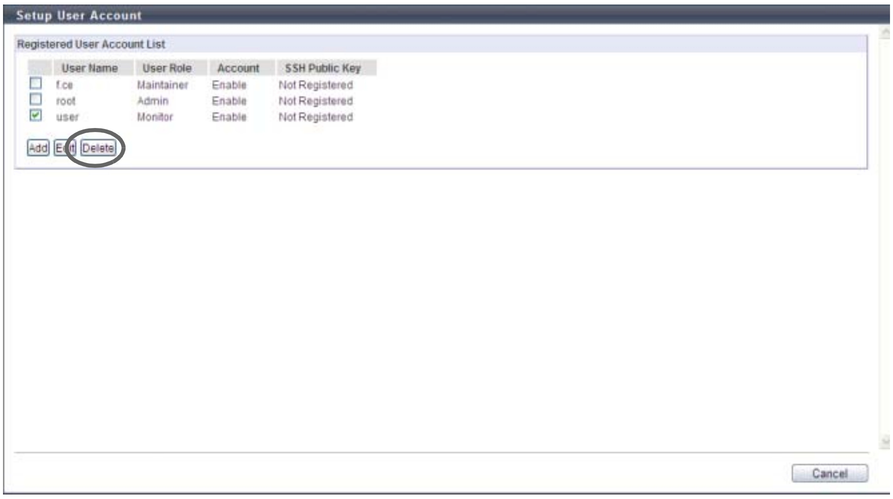
The procedure to delete a user accounts is as follows:

Procedure

1 Click [Setup User Account] in [Action].

2 Select the deletion target user accounts (multiple selections can be made), and click the [Delete] button.

- Checkbox
  Select the checkbox for the user account to be deleted.

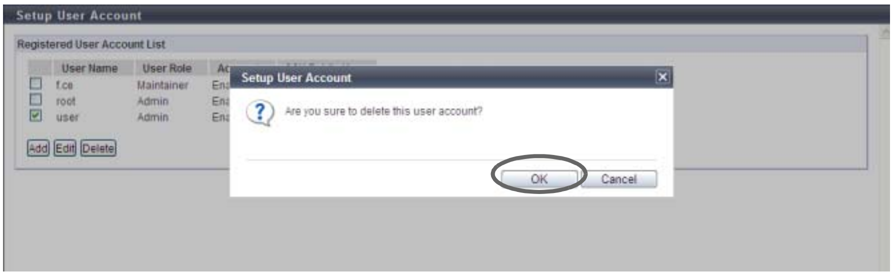


→ A confirmation screen appears.

Caution

When the last user account with the administrator privileges is selected, an error screen appears.

3 Click the [OK] button.



→ The user account deletion starts.

4 Click the [Done] button to return to the [Define Role] screen.

End of procedure

11.2.7.2 Initialize User Account

This function initializes the user accounts to the default status.

Caution

- By using this function, all the registered user accounts are deleted and only the default account remains.
- The password for the default account is restored to the default password.
- The user accounts deleted by this function will be unavailable for the next login.

Note

When the user accounts are initialized, the SSH client public keys for all the users registered in the ETERNUS DX Disk storage system are also deleted.

The procedure to initialize user accounts is as follows:

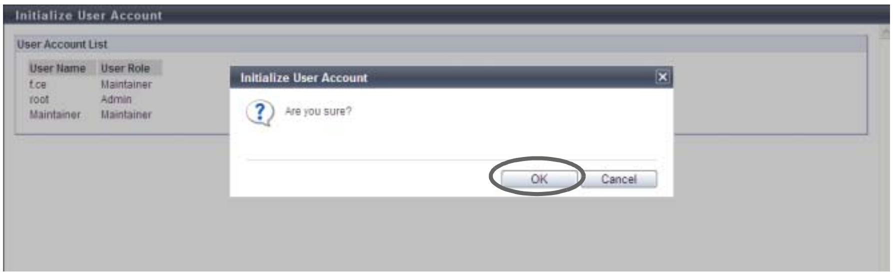
Procedure

1. Click [Initialize User Account] in [Action].
2. Click the [Initialize] button.



→ A confirmation screen appears.

3. Click the [OK] button.



→ The user account initialization starts.

4 Click the [Done] button to return to the [Define Role] screen.

End of procedure

11.2.7.3 Modify RADIUS

This function specifies the external server (RADIUS server) that is used for authentication when logging in. Up to two RADIUS Authentication servers can be registered.

Caution

- Enable or disable RADIUS Authentication for each storage system.
- If RADIUS Authentication fails when "No" has been selected for "Recovery Mode" in the RADIUS Setting field, logging in to GUI will not be available.
- RADIUS Authentication cannot be used when logging in to the Slave CM.
- When "Yes (Communication error)" has been selected for "Recovery Mode" in the RADIUS Setting field, Internal Authentication (*1) is performed if authentication fails in both the primary and the secondary servers due to a network error in either or both of the servers.

*1: This is the standard authentication type. Internal Authentication uses user account information stored in the storage system to verify the input user account.

Note

- There are supplementary notes when using RADIUS Authentication. Refer to "Appendix G Using RADIUS Authentication" (page 1013) for details.
- When using RADIUS Authentication, registering user account information (user name, password, and role) in RADIUS server is required. For details, refer to the manuals provided with the server.
- Even if the RADIUS Authentication function has been changed to "Disable", RADIUS setting information in the ETERNUS DX Disk storage system is maintained.

The procedure to modify RADIUS is as follows:

Procedure

1 Click [Modify RADIUS] in [Action].

2 Specify the parameters, and click the [Modify] button.

● RADIUS Setting

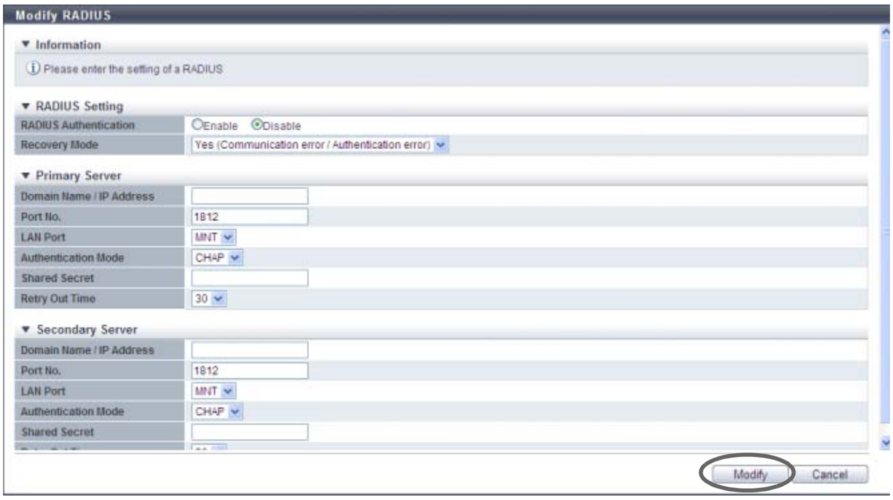
- RADIUS Authentication
  Select whether to "Enable" or "Disable" RADIUS Authentication.
  - Enable
    Use RADIUS Authentication.
  - Disable
    Use Internal Authentication.

- Recovery Mode
  When "Enable" has been specified in the "RADIUS Authentication" field, select the desired operation if RADIUS Authentication fails.
  If RADIUS Authentication fails when "No" has been selected for "Recovery Mode", logging in to GUI will not be available.
  Selecting "Yes" is recommended.
  - Yes (Communication error / Authentication error)
    When communication with the RADIUS server fails or communication with the RADIUS server succeeds but authentication fails, internal authentication is performed.
  - Yes (Communication error)
    When communication with the RADIUS server fails, internal authentication is performed.
  - No
    Even when communication with the RADIUS server fails, or communication with the RADIUS server succeeds but authentication fails, internal authentication is not performed.

Primary Server (required) / Secondary Server

- Domain Name / IP Address
  Input the domain name or the IP address of the RADIUS server.
  There are two methods to specify an IP address; "IPv4" and "IPv6". The following IPv6 addresses can be used; "link local address", "global address", "unique local address", and "6to4 address". Refer to "Available IPv6 Address" (page 757) for details.
  When the current setting is displayed, the IPv6 address is displayed as an abbreviation.
  The following input conditions apply:
  - For IPv4 address
    xxx.xxx.xxx.xxx
    xxx: 1 - 255 for the top field (decimal)
    xxx: 0 - 255 for other fields (decimal)
  - For IPv6 address
    xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
    Refer to "IPv6 Address Notation" (page 378) for details.
- Port No.
  Input the port number that is used for RADIUS Authentication.
  The following input condition applies:
  - Numeric characters ("1" - "65535")
- LAN Port
  Select the LAN port from "MNT" or "RMT" that is to be used for RADIUS Authentication.
- Authentication Mode
  Select the authentication mode for RADIUS Authentication from "CHAP" and "PAP".
- Shared Secret
  Input the same Shared Secret as the RADIUS server.
  The following input condition applies:
  - Up to 64 alphanumeric characters and symbols

- Retry Out Time
  Select the total time (seconds) for waiting for a response from the RADIUS server.
  ETERNUS DX Disk storage system retries authentication during the specified time (seconds), and if there is no response in the specific time, regards the situation as a network error.
  - 10
  - 20
  - 30
  - 40
  - 50
  - 60



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:
- When each parameter fails to satisfy the input conditions
- When the primary server is not specified
- When there is an unspecified parameter for the server
- When the "Domain Name / IP Address" of the Primary server overlaps with that of the Secondary server

3 Click the [OK] button.



→ Setting of the RADIUS Authentication starts.

Caution

An error screen appears if the specified IP address of the RADIUS server conflicts with the internal IP address of the ETERNUS DX Disk storage system.

4 Click the [Done] button to return to the [Define Role] screen.

End of procedure

11.2.7.4 Add Role

This function combines several user policies and creates a user-specific role (custom role).
Up to 20 roles can be created per storage system.

Policy

The 14 types of access privileges shown below are available.

Policies	Description
Status Display	Status display functions (storage system status, RAID group list, volume list, copy session list, etc.)
RAID Group Management	RAID group, Thin Provisioning Pool, ECO mode, hot spare disk setting functions, etc.
Volume - Create / Modify	Volume setting functions (register/modify/expand), etc.
Volume - Delete / Format	Volume setting functions (delete/format), etc.
Host Interface Management	Host interface management functions (host group settings, port group settings, LUN group settings, host affinity settings), etc.
Advanced Copy Management	Local Advanced Copy setting functions, Remote Advanced Copy setting functions, etc.
Copy Session Management	Advanced Copy session management functions (start/stop/delete), etc.
Storage Migration Management	Storage Migration setting functions (start/suspend/stop/restart/delete path), etc.
Storage Management	Configuration setting functions of the ETERNUS DX Disk storage system (date and time, network, remote support), etc.
User Management	User account setting functions (create/change/delete), etc.
Authentication / Role	External authentication and role setting functions (create/change/delete), etc.
Security Setting	Encryption setting functions of drives, etc.
Maintenance Information	Exporting and deleting functions of maintenance information (performance information, configuration information, events, storage system logs, panic dumps), etc.
Maintenance Operation	Maintenance operation/preventive maintenance operation of hardware and firmware

Caution

A role without any user policies cannot be created.

Note

- The ETERNUS DX Disk storage system has default roles. Refer to "Default Role" (page 948) for details.
- Multiple policies can be allocated to one role.
- A role that is created can be allocated to a user account by using the procedure in "11.2.7.1 Setup User Account" (page 853).

The procedure to add a user role is as follows:

Procedure

1 Click [Add Role] in [Action].

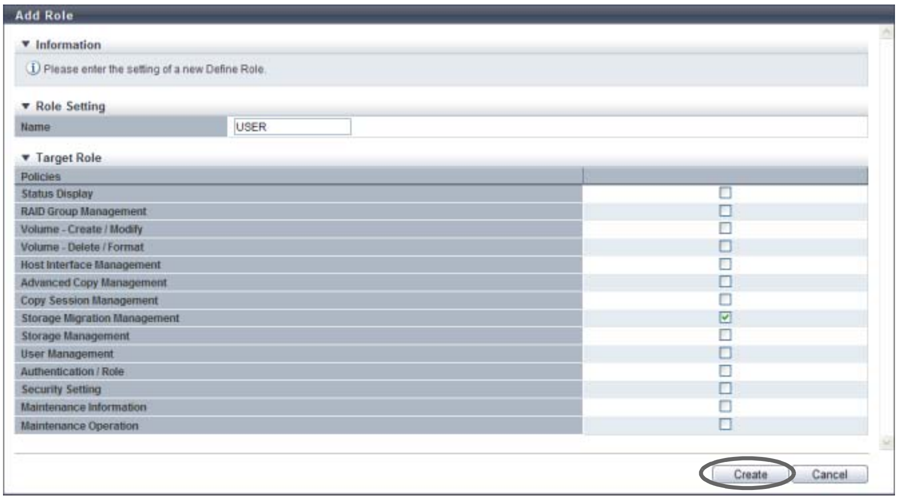
2 Input the role name, select the policies for the role, and click the [Create] button.

Role Setting

- Name
  Input a role name.
  The role name, which has previously been used (including the default role name), cannot be used.
  The following input condition applies:
  - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")

Target Policy

- Policies
  Select the policies that are to be allocated to the user roles.
  - Status Display
  - RAID Group Management
  - Volume - Create / Modify
  - Volume - Delete / Format
  - Host Interface Management
  - Advanced Copy Management
  - Copy Session Management
  - Storage Migration Management
  - Storage Management
  - User Management
  - Authentication / Role
  - Security Setting
  - Maintenance Information
  - Maintenance Operation



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When the "Name" does not satisfy the input conditions
- When the "Name" has already been used

3 Click the [OK] button.



→ Application of the role settings starts.

4 Click the [Done] button to return to the [Define Role] screen.

End of procedure

11.2.7.5 Delete Role

This function deletes the user role (custom role) which was registered by a user.

Caution

- The existing role (default role) cannot be deleted.
- The user role which is allocated to a user account cannot be deleted.

The procedure to delete a role is as follows:

Procedure

1 Select the user role to be deleted (multiple selections can be made) and click [Delete Role] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ The user role is deleted.

3 Click the [Done] button to return to the [Define Role] screen.

End of procedure

11.2.7.6 Modify Role

This function modifies the policies of the user-specific role (custom role).

Caution

- Policies of the existing role (default role) cannot be changed.
- Policies which have been granted to the user account while logged in, can also be modified. Note that the modifications become valid only after the next login.
- A role without any policies cannot be created.
- The [Modify Role] function can be used when a custom role is created.

Note

- Multiple policies can be allocated to one role.
- The modified role can be granted to the user account using the procedure in "11.2.7.1 Setup User Account" (page 853).
- Refer to "Policy" (page 864) for available policies.

The procedure to modify a user role is as follows:

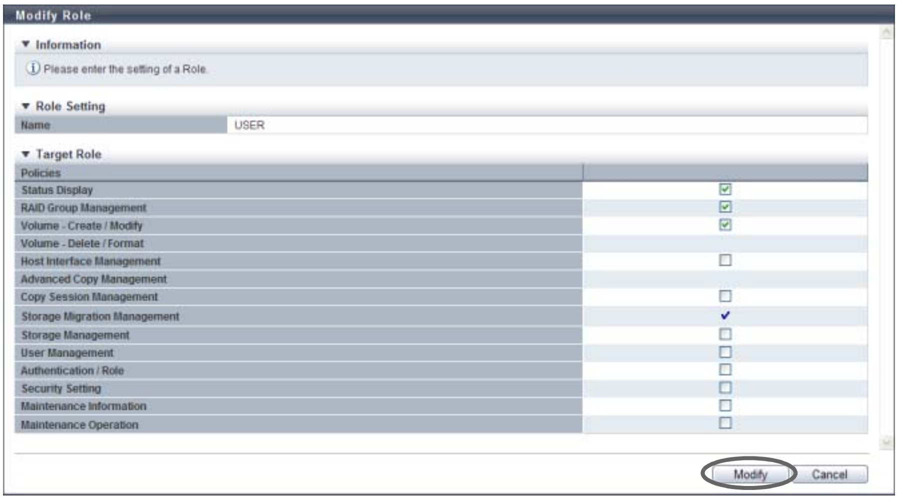
Procedure

1 Select the role to be modified, and click [Modify Role] in [Action].

2 Change the role settings, and click the [Modify] button.

● Target Role

- Policies
  Checkbox of the current user policies are selected. Set the new policies for the role.
  - Status Display
  - RAID Group Management
  - Volume - Create / Modify
  - Volume - Delete / Format
  - Host Interface Management
  - Advanced Copy Management
  - Copy Session Management
  - Storage Migration Management
  - Storage Management
  - User Management
  - Authentication / Role
  - Security Setting
  - Maintenance Information
  - Maintenance Operation



→ A confirmation screen appears.

3 Click the [OK] button.



→ Modification of the role settings starts.

4 Click the [Done] button to return to the [Define Role] screen.

End of procedure

11.2.8 ECO Mode Management

This section describes ECO mode management.
ECO mode management provides the following functions:

- Modify ECO Mode General Setting
- Create ECO Mode Schedule
- Delete ECO Mode Schedule
- Modify ECO Mode Schedule

11.2.8.1 Modify ECO Mode General Setting

This function enables or disables the ECO mode setting for ETERNUS DX Disk storage system.

Caution

ECO mode is not available for the following drives:

- Hot Spares (except Dedicated Hot Spares)
- SSD
- Drives in a RAID group that satisfy the following conditions:
  - A RAID group where no volumes are registered
  - A RAID group where SDPVs are registered
  - RAID group that is registered as an REC Disk Buffer

Note

To create a new ECO mode schedule, refer to "11.2.8.2 Create ECO Mode Schedule" (page 871).

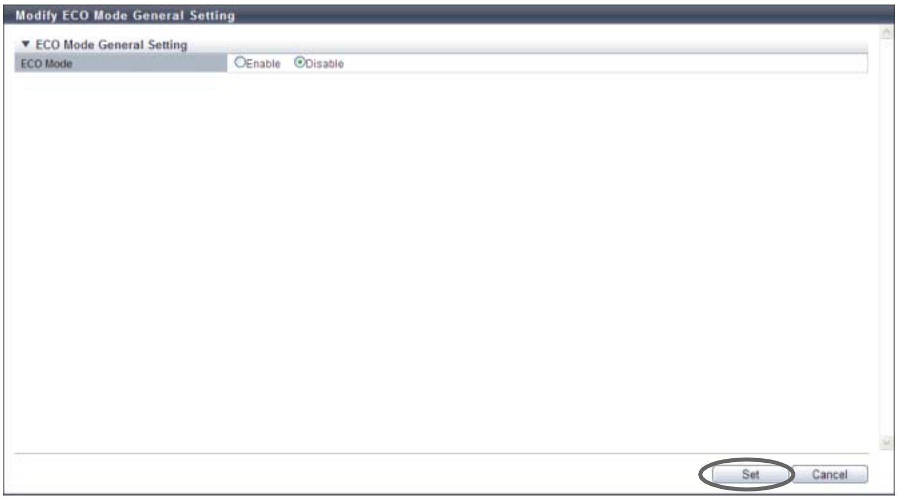
The procedure to set the ECO mode schedule for a RAID group is as follows:

Procedure

1 Click [Modify ECO Mode Setting] in [Action].

2 Specify the parameters, and click the [Set] button.

- ECO Mode
  Select whether to "Enable" or "Disable" the ECO mode for the ETERNUS DX Disk storage system.



→ A confirmation screen appears.

3 Click the [OK] button.



→ The application of the ECO mode general settings starts.

4 Click the [Done] button to return to the [ECO Mode] screen.

End of procedure

11.2.8.2 Create ECO Mode Schedule

This function specifies the disk operating time (term for activating disk motor constantly) as an ECO mode schedule.

- Up to 64 ECO mode schedules can be created for each storage system.
- Up to eight events can be specified for a single ECO mode schedule.

Caution

- To perform schedule operations using this function, the ECO mode setting for the ETERNUS DX Disk storage system must be enabled.
- Disk operation time varies depending on the ECO mode schedule settings and disk access. A disk is spun up even if it is outside of disk operation time in the following conditions:
  - If disk access occurs while the disk motor is stopped:
    The disk is immediately spun up and can be accessed within 1 - 5 minutes.
  - If a disk is activated more than a set amount of times in a day:
    A state of increased access frequency is assumed and the ECO mode will cease stopping the disk motor.

Note

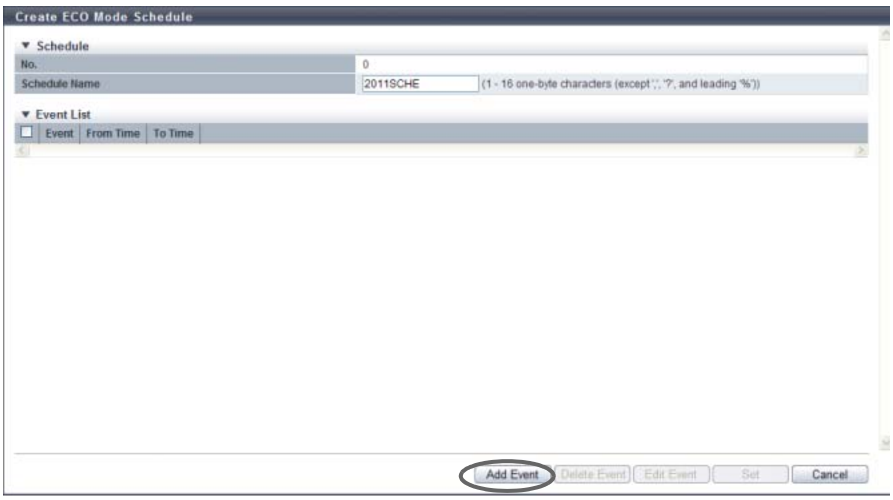
- To apply the created ECO Mode schedule to RAID groups, refer to the procedure in "6.2.7 Assign ECO Mode Schedule (RAID Group)" (page 192).
- To apply the created ECO Mode schedule to each Thin Provisioning Pool, refer to the procedure in "7.2.9 Assign ECO Mode Schedule (Thin Provisioning Pool)" (page 242).

The procedure to create an ECO Mode schedule is as follows:

Procedure

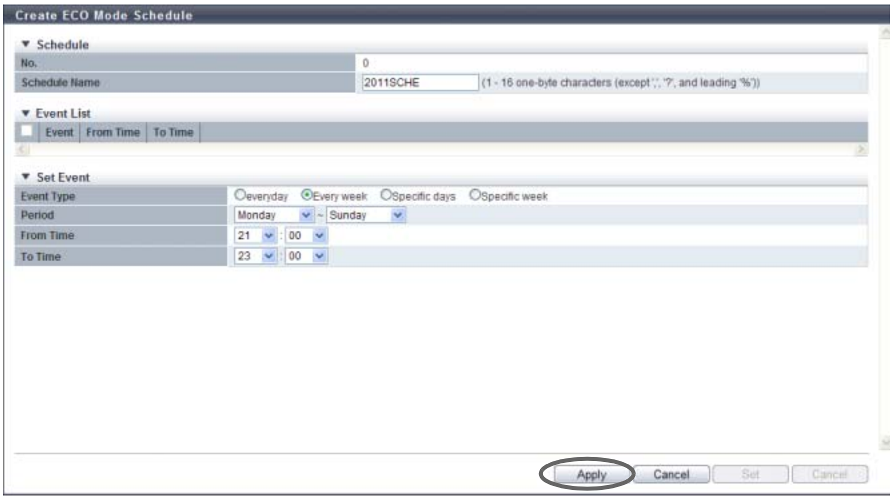
1 Click [Create Schedule] in [Action].

2 Specify the schedule name, and click the [Add Event] button.



3 Select an event type, set the event details, and then click the [Apply] button.

- Event Type
  Select the event type. The settings vary depending on the event type.
  - everyday
  - Every week
  - Specific days
  - Specific week
- Event Type
  - everyday
    Select this to add or edit the daily schedule.
    When "everyday" is selected, enter the start time ("From Time") and the end time ("To Time").
    If the "From Time" is later than the "To Time", the end time is treated as the next day.
    - From Time: 00:00 - 23:30 (Can be specified at intervals of 30 minutes)
    - To Time: 00:00 - 23:30 (Can be specified at intervals of 30 minutes)
  - Every week
    Select this to add or edit the weekly schedule.
    When "Every week" is selected, enter the term ("Period"), the start time ("From Time"), and the end time ("To Time").
    If the "From Time" is later than the "To Time", the end time is treated as the next day.
    - Period (start day): Monday - Sunday
    - Period (end day): Monday - Sunday
    - From Time: 00:00 - 23:30 (Can be specified at intervals of 30 minutes)
    - To Time: 00:00 - 23:30 (Can be specified at intervals of 30 minutes)
  - Specific days
    Select this to add or edit the schedule based on specific days.
    When "Specific days" is selected, enter the month ("Month"), the term ("Period"), the start time ("From Time"), and the end time ("To Time").
    If the "From Time" is later than the "To Time", the end time is treated as the next day.
    - Month: Every Month, January - December
    - Period (start date): 01 - 31
    - Period (term): One day only, 2 days - 7 days
    - From Time: 00:00 - 23:30 (Can be specified at intervals of 30 minutes)
    - To Time: 00:00 - 23:30 (Can be specified at intervals of 30 minutes)
  - Specific week
    Select this to add or edit the schedule based on a specific week.
    When "Specific week" is selected, enter the month ("Month"), the term ("Period"), the start time ("From Time"), and the end time ("To Time").
    If the "From Time" is later than the "To Time", the end time is treated as the next day.
    - Month: Every Month, January - December
    - Period (nth week): 1st - 4th, Last
    - Period (start day): Monday - Sunday
    - Period (end day): Monday - Sunday
    - From Time: 00:00 - 23:30 (Can be specified at intervals of 30 minutes)
    - To Time: 00:00 - 23:30 (Can be specified at intervals of 30 minutes)



→ The event is added to the "Event List".

Caution

An error screen appears in the following conditions:

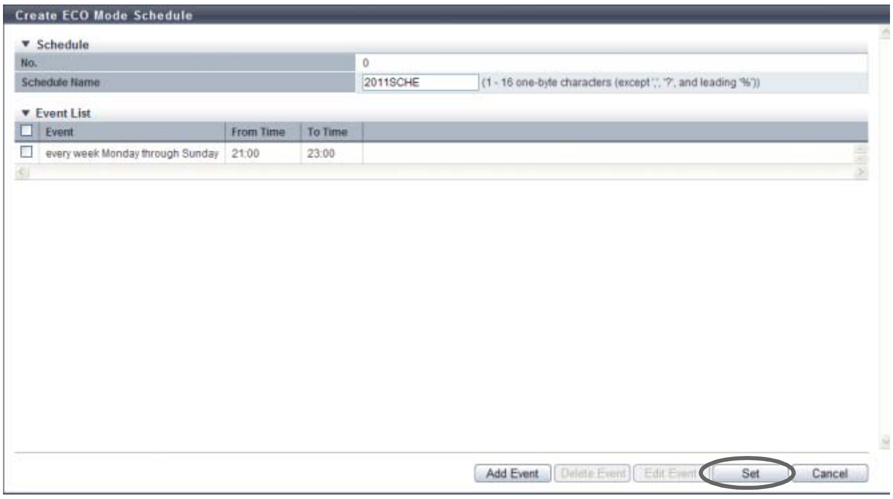
- "everyday" is selected for the event type when the start time and end time are the same
- "Every week" is selected for the event type when the start day and the end day are the same, and the start time and the end time are also the same
- "Every week" is selected for the event type when the start day is later than the end day
- "Every week" is selected for the event type when the start day and the end day are the same, and the start time is later than the end time
- "Specific days" is selected for the event type, and a non-existent date (for example, February 30) is set
- "Specific days" is selected for the event type when "One day only" is selected for the period, and the start time and end time are the same
- "Specific days" is selected for the event type when "One day only" is selected for the period, and the start time is later than the end time
- "Specific week" is selected for the event type when the start day and the end day are the same, and the start time and the end time are the same
- "Specific week" is selected for the event type when the start day is later than the end day
- "Specific week" is selected for the event type when the start day and the end day are the same, and start time is later than the end time
- The period is set to include Sunday
- The period is 1 week or longer (the end date is set to "7 days" when the end time is later than the start time)

Note

- When deleting the added event, select the event, and click the [Delete] button.
- When changing the added event, select the event, and click the [Edit] button.

4 Repeat Step 2 and Step 3 to configure multiple events.

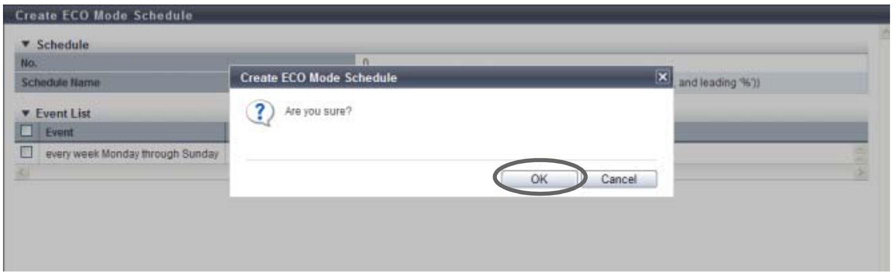
5 After adding all the events, click the [Set] button.



→ A confirmation screen appears.

> **Caution**
>
> An error screen appears in the following conditions:
> - "Schedule Name" has not been entered
> - "Schedule Name" matches with an existing schedule name

6 Click the [OK] button.



→ Creation of the ECO mode schedule starts.

7 Click the [Done] button to return to the [ECO Mode] screen.

End of procedure

11.2.8.3 Delete ECO Mode Schedule

This function deletes the ECO mode schedule.

Caution

- An ECO mode schedule that is allocated to a RAID group cannot be deleted.
- An ECO mode schedule that is allocated to a Thin Provisioning Pool cannot be deleted.

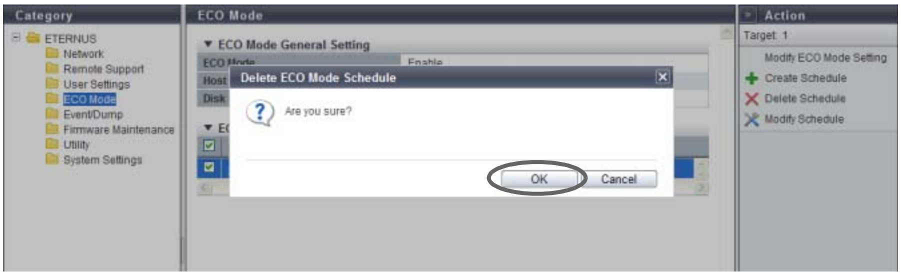
The procedure to delete an ECO Mode schedule is as follows:

Procedure

1. Select the schedule that is to be deleted (multiple selections can be made) and click [Delete Schedule] in [Action].

   → A confirmation screen appears.

2. Click the [OK] button.



   → Deletion of the ECO mode schedule starts.

3. Click the [Done] button to return to the [ECO Mode] screen.

End of procedure

11.2.8.4 Modify ECO Mode Schedule

This function modifies the ECO mode schedule.
Up to eight events can be specified for a single ECO mode schedule.

Caution

Disk operation time varies depending on the ECO mode schedule settings and disk access.
A disk is spun up even if it is outside of disk operation time in the following conditions:

- If disk access occurs while the disk motor is stopped:
  The disk is immediately spun up and can be accessed within 1 - 5 minutes.
- If a disk is activated more than a set amount of times in a day:
  A state of increased access frequency is assumed and the ECO mode will cease stopping the disk motor.

Note

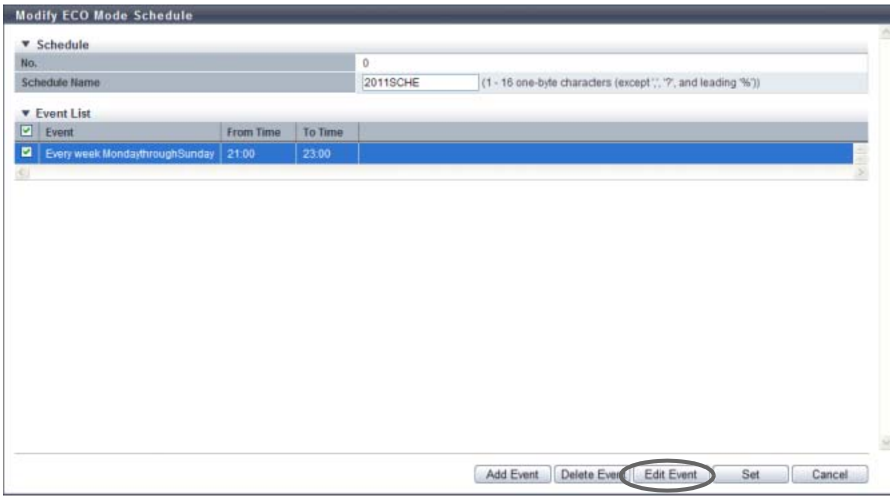
- To apply the modified ECO Mode schedule to RAID groups, refer to the procedure in "6.2.7 Assign ECO Mode Schedule (RAID Group)" (page 192).
- To apply the modified ECO Mode schedule to each Thin Provisioning Pool, refer to the procedure in "7.2.9 Assign ECO Mode Schedule (Thin Provisioning Pool)" (page 242).

The procedure to edit an ECO Mode schedule is as follows:

Procedure

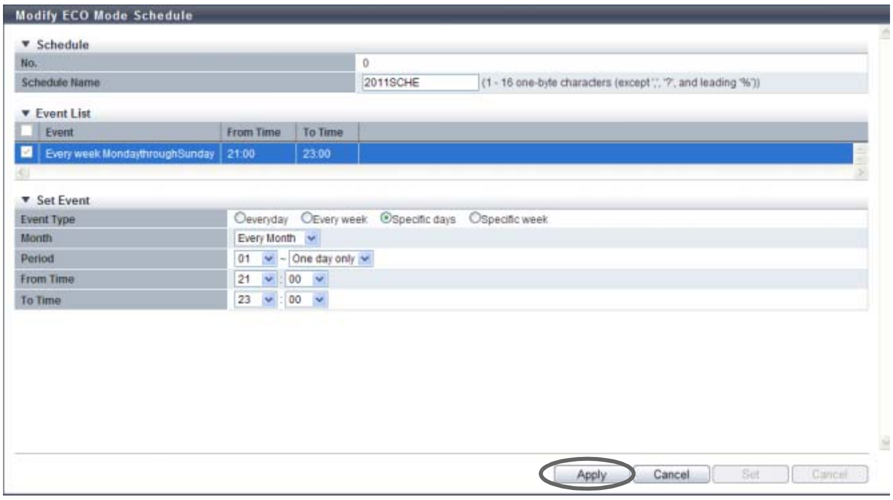
1 Select the ECO mode schedule that is to be edited and click [Modify Schedule] in [Action].

2 Select the event that is to be modified and click the [Edit Event] button.



3 After the event content is modified, click the [Apply] button.

- Event Type
  Select the event type. The settings vary depending on the event type.
  - everyday
  - Every week
  - Specific days
  - Specific week
- Event Type
  - everyday
    Select this to add or edit the daily schedule.
    When "everyday" is selected, enter the start time ("From Time") and the end time ("To Time").
    If the "From Time" is later than the "To Time", the end time is treated as the next day.
    - From Time: 00:00 - 23:30 (Can be specified at intervals of 30 minutes)
    - To Time: 00:00 - 23:30 (Can be specified at intervals of 30 minutes)
  - Every week
    Select this to add or edit the weekly schedule.
    When "Every week" is selected, enter the term ("Period"), the start time ("From Time"), and the end time ("To Time").
    If the "From Time" is later than the "To Time", the end time is treated as the next day.
    - Period (start day): Monday - Sunday
    - Period (end day): Monday - Sunday
    - From Time: 00:00 - 23:30 (Can be specified at intervals of 30 minutes)
    - To Time: 00:00 - 23:30 (Can be specified at intervals of 30 minutes)
  - Specific days
    Select this to add or edit the schedule based on specific days.
    When "Specific days" is selected, enter the month ("Month"), the term ("Period"), the start time ("From Time"), and the end time ("To Time").
    If the "From Time" is later than the "To Time", the end time is treated as the next day.
    - Month: Every Month, January - December
    - Period (start date): 01 - 31
    - Period (term): One day only, 2 days - 7 days
    - From Time: 00:00 - 23:30 (Can be specified at intervals of 30 minutes)
    - To Time: 00:00 - 23:30 (Can be specified at intervals of 30 minutes)
  - Specific week
    Select this to add or edit the schedule based on a specific week.
    When "Specific week" is selected, enter the month ("Month"), the term ("Period"), the start time ("From Time"), and the end time ("To Time").
    If the "From Time" is later than the "To Time", the end time is treated as the next day.
    - Month: Every Month, January - December
    - Period (nth week): 1st - 4th, Last
    - Period (start day): Monday - Sunday
    - Period (end day): Monday - Sunday
    - From Time: 00:00 - 23:30 (Can be specified at intervals of 30 minutes)
    - To Time: 00:00 - 23:30 (Can be specified at intervals of 30 minutes)



→ The "Event List" is updated.

Caution

An error screen appears in the following conditions:

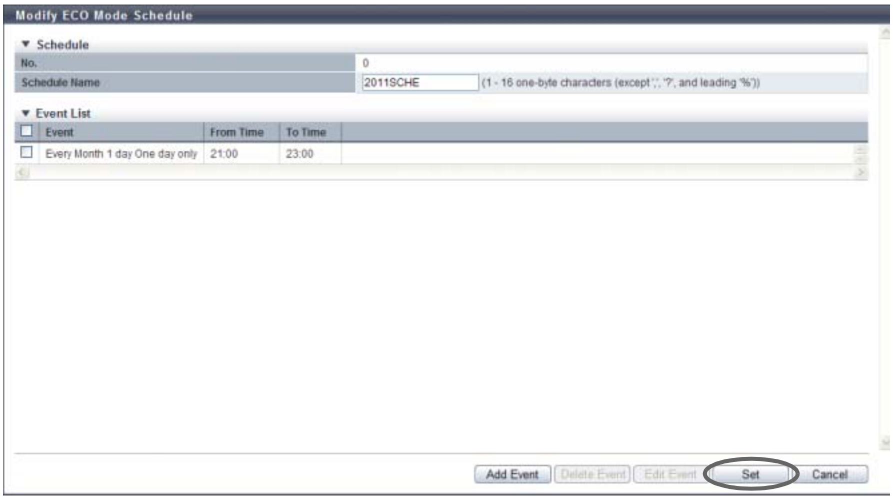
- "everyday" is selected for the event type when the start time and end time are the same
- "Every week" is selected for the event type when the start day and the end day are the same, and the start time and the end time are also the same
- "Every week" is selected for the event type when the start day is later than the end day
- "Every week" is selected for the event type when the start day and the end day are the same, and the start time is later than the end time
- "Specific days" is selected for the event type, and a non-existent date (for example, February 30) is set
- "Specific days" is selected for the event type when "One day only" is selected for the period, and the start time and end time are the same
- "Specific days" is selected for the event type when "One day only" is selected for the period, and the start time is later than the end time
- "Specific week" is selected for the event type when the start day and the end day are the same, and the start time and the end time are the same
- "Specific week" is selected for the event type when the start day is later than the end day
- "Specific week" is selected for the event type when the start day and the end day are the same, and start time is later than the end time
- The period is set to include Sunday
- The period is 1 week or longer (the end date is set to "7 days" when the end time is later than the start time)

Note

- When adding an event, click the [Add] button.
- When deleting the event, select the target event(s) that is to be deleted, and click the [Delete] button.

4 Repeat Step 2 and Step 3 to edit multiple events.

5 After editing all the events, click the [Set] button.



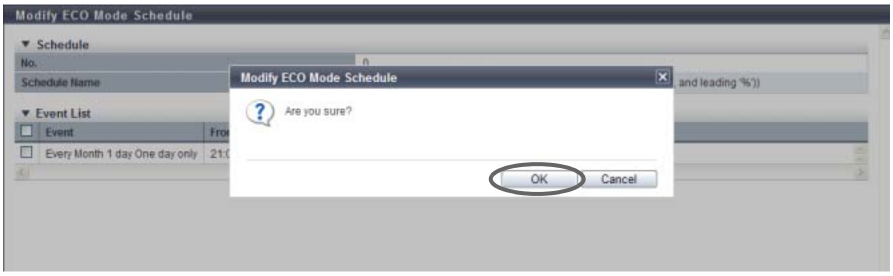
→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- "Schedule Name" has not been entered
- "Schedule Name" matches with an existing schedule name

6 Click the [OK] button.



→ Modification of the ECO mode schedule starts.

7 Click the [Done] button to return to the [ECO Mode] screen.

End of procedure

11.2.9 Event/Dump Management

This section describes event/dump management.
Event/dump management provides the following functions:

- Setup Event Notification
- Display Event Log
- Export/Delete Log
- Export Panic Dump

11.2.9.1 Setup Event Notification

This function specifies whether to report events that are detected in the ETERNUS DX Disk storage system.
There are six methods for event notification: Host Sense Key Code Qualifier, SNMP Trap, E-Mail, syslog, REMCS (for regions other than EMEA), and AIS Connect (for regions other than Japan).
A notification setting can be selected for each type of event.

Caution

- For SNMP Trap notification, performing procedures in "11.2.3.3 Setup SNMP Agent Basic Interface" (page 761), "11.2.3.4 Setup SNMP Manager" (page 763), "11.2.3.5 Setup SNMP Agent MIB Access View" (page 766), "11.2.3.6 Setup SNMP Agent User" (page 768), "11.2.3.7 Setup SNMP Agent Community" (page 771), and "11.2.3.8 Setup SNMP Agent Trap" (page 774) is required.
- For E-Mail notification, performing procedure in "11.2.3.12 Setup E-Mail Notification" (page 781) is required.
- For syslog notification, performing procedure in "11.2.3.13 Setup Syslog" (page 783) is required.
- For REMCS notification, performing procedure in "11.2.4.2 Setup Remote Support" (page 800) is required (for regions other than EMEA).
- For AIS Connect notification, performing procedure in "11.2.5.1 Setup AIS Connect Environment" (page 821) is required (for regions other than Japan).

Note

- When selecting REMCS for event notification, only the REC related error event settings can be changed.
- In the following sections, "REMCS (for regions other than EMEA)" is referred to as "REMCS" and "AIS Connect (for regions other than Japan)" is referred to as "AIS Connect".

The procedure to set the event notification is as follows:

Procedure

1 Click [Setup Event Notification] in [Action].

2 Specify whether to notify each event, and click the [Set] button.

> **Note**
>
> The events are classified into three levels: "Error Severity Level", "Warning Level", and "Informational Level".
> Click the [Setting based on Severity] tab, [Error Severity Level] tab, [Warning Level] tab or [Informational Level] tab to display the setting fields for each level.

- Setting based on Severity

  Select whether to notify of an event by levels. Checkboxes are displayed for selectable notification methods.

  - All Error Events
    Select whether to notify when an error level event occurs. When notifying, select the notification method.
    By selecting or clearing the checkbox, the same setting can be applied for all the "Error Severity Level" events.

  - All Warning Events
    Select whether to notify when a warning level event occurs. When notifying, select the notification method.
    By selecting or clearing the checkbox, the same setting can be applied for all the "Warning Severity Level" events.

  - All Informational Events
    Select whether to notify when a informational level event occurs. When notifying, select the notification method.
    By selecting or clearing the checkbox, the same setting can be applied for all the "Informational Level" events.

  - Individual Settings within Severity Level
    "Yes" is displayed when the target notification method ("Host Sense Key Code Qualifier", "SNMP Trap", "E-Mail", "syslog", "REMCS", or "AIS Connect") is specified for any event in "Error Severity Level", "Warning Level", or "Informational Level", if not, "No" is displayed.

  - Blink Fault LED at warning
    Select "Enable" when setting the Fault LED in the front panel to blink while a warning level event occurs, and select "Disable" when setting the Fault LED not to blink.

  - Turn on Fault LED when redundant copy is completed
    Select "Enable" when setting the Fault LED of the drive to turn on while a warning level event occurs, and select "Disable" when setting the Fault LED not to turn on.

- Display parts (except disk) with error status on LCD
  Select "Enable" when displaying the part (other than disk) error message in the LCD, and select "Disable" to not display the message in the LCD. This setting is available only when using the ETERNUS DX8700 S2.
- Display parts (except disk) with warning status on LCD
  Select "Enable" when displaying the part (other than disk) warning message in the LCD, and select "Disable" to not display the message in the LCD. This setting is available only when using the ETERNUS DX8700 S2.
- Display disks with error status on LCD
  Select "Enable" when displaying the drive error message in the LCD for each condition shown below, and select "Disable" to not display the message in the LCD. This setting is available only when using the ETERNUS DX8700 S2.
  - Any Time
    Always notifies when a drive error occurs.
  - when HS<0
    Notifies only if a drive error occurs when available hot spare disk is " 0". This item can be selected only when the "Display disks with error status on LCD (Any Time)" checkbox is cleared.
- Display disks with warning status on LCD
  Select "Enable" when displaying the part (other than disk) warning message in the LCD, and select "Disable" to not display the message in the LCD. This function is available only when using the ETERNUS DX8700 S2.
  - Any Time
    Always notifies when a drive warning status occurs.
  - when HS<0
    Notifies only if a drive warning status occurs when available hot spare disk is " 0". This item can be selected only when the "Display disks with warning status on LCD (Any Time)" checkbox is cleared.

Note

For the ETERNUS DX8700 S2, whether to display the LCD message in the Overview screen and the LCD panel on the Operation panel is determined by the notification setting that is specified for this function.

Error Severity Level

Select whether to notify of the error event for each event type.

- Parts Error
  Select whether to notify when a failure occurs in a part other than the drive. When notifying, select the notification method.
- Disk Error
  Select whether to notify when a drive failure occurs for each condition shown below. When notifying, select the notification method.
  - Any Time
    Always notifies when a drive failure occurs.
  - when HS<0
    Notifies only if a drive failure occurs when available hot spare disk is " 0" (*1).
    *1: When rebuilding cannot be performed because there are no hot spares that can be used as a substitute for the failed drive.

- Temperature Error
  Select whether to notify when a temperature error status is detected by the sensor. When notifying, select the notification method.
- End of battery life
  Select whether to notify when a battery expires. When notifying, select the notification method.
  "End of battery life" notification is available only for the ETERNUS DX410 S2/DX440 S2 or the ETERNUS DX8100 S2/DX8700 S2.
- Rebuild/Copyback w/ redundant
  Select whether to notify when rebuilding or copy backing (with redundancy) (*1) is performed. When notifying, select the notification method.
  *1: "Rebuilding to hot spare disk is complete", "Copyback starts" and "Copyback complete" are equivalent to "Redundancy".
- Rebuild/Copyback w/o redundant
  Select whether to notify when rebuilding or copy backing (without redundancy) (*1) occurs for each condition shown below. When notifying, select the notification method.
  - Any Time
    Always notifies when rebuilding or copy backing (without redundancy) occurs.
  - when HS<0
    Notifies only if rebuilding or copy backing (without redundancy) occurs when the available hot spare disk is "0".
  *1: "Rebuild to hot spare disk is started", "Rebuild to hot spare disk failed" and "Copyback failed" are equivalent to "Without redundancy".
- Redundant
  Select whether to notify when a redundant copy starts or ends abnormally for each condition shown below. When notifying, select the notification method.
  - Any Time
    Always notifies when a redundant copy starts or ends abnormally.
  - when HS<0
    Notifies only if a redundant copy starts or ends abnormally when the available hot spare disk is "0".
- Complete Redundant Copy
  Select whether to notify when a redundant copy is complete. When notifying, select the notification method.
- Complete rebuild
  Select whether to notify when a bad sector (*1) is detected in the hot spare where rebuilding is completed. When notifying, select the notification method.
  *1: A bad sector is the location information (address and length) where an error such as data reading error occurs during rebuild, copyback, or redundant copy.
- Bad data
  Select whether to notify when a bad sector is detected in the drive. When notifying, select the notification method.

- Pinned data
Select whether to notify when pinned data (*1) is detected or disappears. When notifying, select the notification method.
*1: "Pinned data" is the data left in the cache due to unsuccessful write-back to the drive from the cache area.

- Not ready
Select whether to notify when the ETERNUS DX Disk storage system is in "Not ready" status (*1). When notifying, select the notification method.
*1: "Not ready" is the status in which the ETERNUS DX Disk storage system cannot operate properly due to a cause such as failures in multiple parts.

- Remote Path Error
Select whether to notify when a copy path error occurs. When notifying, select the notification method.

- REC Buffer Halt (Path Error)
Select whether to notify when an REC Buffer halt caused by copy path error occurs. When notifying, select the notification method.

- REC Buffer Halt (Overload)
Select whether to notify when an REC Buffer halt caused by overload occurs. When notifying, select the notification method.

- REC Buffer Halt (Other Error)
Select whether to notify when an REC Buffer halt caused by an error occurs. When notifying, select the notification method.

- Copy Session Error
Select whether to notify when an error is detected in the Advanced Copy session or when a failed Advanced Copy session is recovered. When notifying, select the notification method.

- Thin Provisioning Pool Rate
Select whether to notify when the TPP usage changes (*1). When notifying, select the notification method.
*1: Notify when the TPP usage changes as follows:
  - From "Normal" to "Attention"
  - From "Normal" or "Attention" to "Warning"
  - The TPP capacity is exhausted

- SED Network Error
Select whether to notify when the communication between the ETERNUS DX Disk storage system and the key server is disconnected. When notifying, select the notification method.

Warning Severity Level

Select whether to notify of a warning event for each event type.

- Parts Warning
  Select whether to notify when a warning level event occurs in a part other than the drive. When notifying, select the notification method.

- Disk Warning
  Select whether to notify when a warning level event occurs in the drive for each condition shown below. When notifying, select the notification method.
  - Any Time
    Always notifies when a warning level event occurs in the drive.
  - when HS<0
    Notifies only if a warning level event occurs in the drive when available hot spare disk is "0" (*1).
    *1: When rebuilding cannot be performed because there are no hot spares that can be used as a substitute for the failed drive.

- Temperature Warning
  Select whether to notify when a temperature warning status is detected by the sensor. When notifying, select the notification method.

- Battery life Warning
  Select whether to notify a battery expiration in advance (*1). When notifying, select the notification method.
  "Battery life Warning" notification is available only for ETERNUS DX410 S2/DX440 S2 or ETERNUS DX8100 S2/DX8700 S2.
  *1: Advance notice of battery expiration is issued once "6 months before", once "a week before", and once a day during the period from "6 days before" to "the expiration date".

Informational Level

Select whether to notify of an informational event for each event type.

- Recovery module
  Select whether to notify when the failed part is recovered by taking actions such as replacement. When notifying, select the notification method.

- Temperature restoration
  Select whether to notify when a temperature error or warning status is recovered to the normal status. When notifying, select the notification method.

- User login/logout
  Select whether to notify when a User login/logout is detected. When notifying, select the notification method.

- Operated RAID Group
  Select whether to notify when the RAID group has been created or deleted. When notifying, select the notification method.

- Added/Released Hot Spare
  Select whether to notify when the hot spare disk has been registered or released. When notifying, select the notification method.

- Operated Volume
  Select whether to notify when the volume has been created or deleted. When notifying, select the notification method.
- Power off/on Apply Firmware
  Select whether to notify when the ETERNUS DX Disk storage system is turned off/on or when the controller firmware is changed in hot mode. When notifying, select the notification method.
- SDP Usage Rate Over Lv1
  Select whether to notify when an SDP Policy Level 1 (Informational) event occurs. When notifying, select the notification method.
- SDP Usage Rate Over Lv2
  Select whether to notify when an SDP Policy Level 2 (Warning) event occurs. When notifying, select the notification method.
- SDP Usage Rate Over Lv3
  Select whether to notify when an SDP Policy Level 3 (Error) event occurs. When notifying, select the notification method.
- Copy Table Size Usage Rate Over
  Select whether to notify when the copy table usage exceeds the threshold. When notifying, select the notification method.
- Trial copy license expired
  Select whether to notify when a copy trial license expiration event occurs. When notifying, select the notification method.
- No Free Space on ODX Buffer Volume
  Select whether to notify when an insufficient free space event for an ODX Buffer volume occurs. When notifying, select the notification method.
- SED Network Error Recovered
  Select whether to notify when the communication between the ETERNUS DX Disk storage system and the key server is recovered. When notifying, select the notification method.
- FC CA Port Link Status Changed
  Select whether to notify when a link down occurs after an FC link is established and the link status is changed. When notifying, select the notification method. Note that a change in the link status due to user operation is not notified.
  A change in the link status for all the FCs is notified. The notification is reported regardless of the type (8G FC or 16G FC), the port mode (CA, RA, CA/RA, Initiator), and the transfer rate. The following FC link status types can be detected and notified:
  - The link status between the ETERNUS DX Disk storage system and a directly connected server
  - The link status between the ETERNUS DX Disk storage system and switches

  The FC link status can be checked in the [Port Detail] screen. Refer to "10.1.2.3 All Channel Adapters" (page 636) for details.

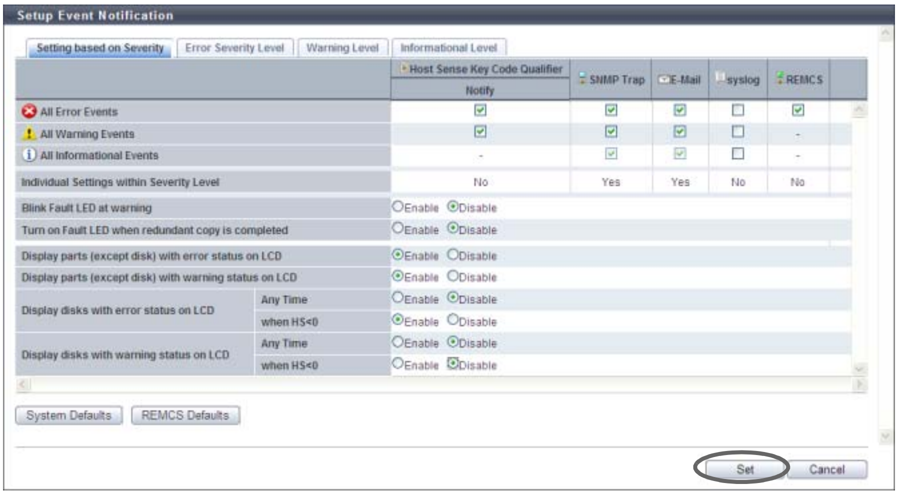
Note

- Only the FC link status is notified. Note that a change in link status for iSCSI, SAS, and FCoE is not notified.
- Link up and Link down that occur due to the following user operations are not notified.
  - Rebooting of the ETERNUS DX Disk storage system
  - Hot maintenance of a CA or a CM in which a CA is installed
  - Preventive maintenance of a CA or a CM in which a CA is installed
  - Chip reset due to a change in the FC port parameters
- If the occurrence of link down and link up repeats within a 10 second interval, the first two sets of link down and link up are notified. Notification of this event is suspended for 20 minutes after the notification.
- Note that the link status between a server and a switch cannot be detected.

- Host Login Over
  Select whether to notify when the number of connected hosts for each CA port exceeds the maximum value (256 hosts). When notifying, select the notification method.
  This item is notified regardless of the CA type (FC, iSCSI, SAS, and FCoE).

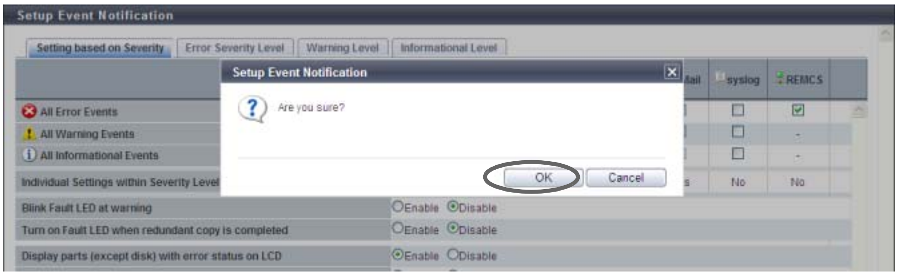
Note

- Threshold of SDP usage can be specified using the procedure in "8.2.11 Modify Copy Parameters" (page 316).
- Threshold of copy table size usage can be specified using the procedure in "8.2.7 Modify Copy Table Size" (page 301).
- If free space of an ODX Buffer volume is insufficient, expand the volume capacity. Refer to the procedure in "5.2.5 Expand Volume" (page 117), "5.2.6 Expand Thin Provisioning Volume" (page 121), or "5.2.7 Start RAID Migration" (page 123) for details.



→ A confirmation screen appears.

3 Click the [OK] button.



→ Setting of the event notification starts.

4 Click the [Done] button to return to the [Event/Dump] screen.

End of procedure

System Defaults

The initial state of event notification is as follows:

Item	Notification method					
	Host Sense Key Code Qualifier	SNMP Trap	E-Mail	syslog	REMCS	AIS Connect
All Error Events	Selected/ Cleared	Selected/ Cleared	Selected/ Cleared	Cleared	Selected/ Cleared	Selected/ Cleared
All Warning Events	Selected	Selected	Selected	Cleared	–	Selected
All Informational Events	–	Selected/ Cleared	Selected/ Cleared	Cleared	–	Selected/ Cleared
Individual Settings within Severity Level	Yes	Yes	Yes	No	Yes	Yes

Selected: Notify
Cleared: Not notify
Selected/Cleared: Some events are notified and other events are not notified
–: Not applicable to notification

Event		Notification	Remarks
Blink Fault LED at warning		Enable	
Turn on Fault LED when redundant copy is completed		Disable	
Display parts (except disk) with error status on LCD		Enable	This setting is available only when using the ETERNUS DX8700 S2.
Display parts (except disk) with warning status on LCD		Enable	
Display disks with error status on LCD	Any Time	Enable	
	when HS<0	Disable	
Display disks with warning status on LCD	Any Time	Enable	
	when HS<0	Disable	

Level	Event		Notification method					
			Host Sense Key Code Qualifier	SNMP Trap	E-Mail	syslog	REMCS	AIS Connect
Error	Parts Error		Selected	Selected	Selected	Cleared	Selected (fixed)	Selected
	Disk Error	Any Time	Selected	Selected	Selected	Cleared	Selected (fixed)	Selected
		when HS<0	Cleared	Cleared	Cleared	Cleared	–	Cleared
	Temperature Error		Selected	Selected	Selected	Cleared	Selected (fixed)	Selected
	End of battery life		Selected	Selected	Selected	Cleared	Selected (fixed)	Selected
	Rebuild/Copyback w/ redundant		Selected	Cleared	Cleared	Cleared	Cleared	Cleared
	Rebuild/ Copyback w/o redundant	Any Time	Selected	Cleared	Cleared	Cleared	Cleared	Cleared
		when HS<0	Cleared	Cleared	Cleared	Cleared	–	Cleared
	Redundant	Any Time	Cleared	Cleared	Cleared	Cleared	Cleared	Cleared
		when HS<0	Cleared	Cleared	Cleared	Cleared	–	Cleared
	Complete Redundant Copy		Cleared	Cleared	Cleared	Cleared	Selected	Selected
	Complete rebuild		Selected	Selected	Selected	Cleared	Selected (fixed)	Selected
	Bad data		Selected	Selected	Selected	Cleared	Selected (fixed)	Selected
	Pinned data		Selected (*1)	Selected	Selected	Cleared	Selected (fixed)	Selected
	Not ready		Selected	Selected	Selected	Cleared	Selected (fixed)	Selected
	Remote Path Error		Selected	Selected	Selected	Cleared	Selected	Selected
	REC Buffer Halt (Path Error)		–	Selected	Selected	Cleared	Selected	Selected
	REC Buffer Halt (Overload)		–	Selected	Selected	Cleared	Selected	Selected
	REC Buffer Halt (Other Error)		–	Selected	Selected	Cleared	Selected	Selected
	Copy Session Error		–	Cleared	Cleared	Cleared	Cleared	Cleared
	Thin Provisioning Pool Rate		–	Selected	Selected	Cleared	–	Cleared
	SED Network Error		–	Selected	Selected	Cleared	Cleared	Cleared

Level	Event		Notification method					
			Host Sense Key Code Qualifier	SNMP Trap	E-Mail	syslog	REMCS	AIS Connect
Warning	Parts Warning		Selected	Selected	Selected	Cleared	Selected (fixed)	Selected
	Disk Warning	Any Time	Selected	Selected	Selected	Cleared	Selected (fixed)	Selected
		when HS<0	Cleared	Cleared	Cleared	Cleared	–	Cleared
	Temperature Warning		Selected	Selected	Selected	Cleared	Selected (fixed)	Selected
	Battery life Warning		Selected	Selected	Selected	Cleared	Selected (fixed)	Selected
Informational	Recovery module		–	Cleared	Cleared	Cleared	–	Cleared
	Temperature restoration		–	Cleared	Cleared	Cleared	–	Cleared
	User login/logout		–	Cleared	Cleared	Cleared	–	Cleared
	Operated RAID Group		–	Cleared	Cleared	Cleared	–	Cleared
	Added/Released Hot Spare		–	Cleared	Cleared	Cleared	–	Cleared
	Operated Volume		–	Cleared	Cleared	Cleared	–	Cleared
	Power off/on Apply Firmware		–	Cleared	Cleared	Cleared	–	Cleared
	SDP Usage Rate Over Lv1		–	Cleared	Cleared	Cleared	–	Cleared
	SDP Usage Rate Over Lv2		–	Cleared	Cleared	Cleared	–	Cleared
	SDP Usage Rate Over Lv3		–	Cleared	Cleared	Cleared	–	Cleared
	Copy Table Size Usage Rate Over		–	Cleared	Cleared	Cleared	–	Cleared
	Trial copy license expired		–	Selected	Selected	Cleared	–	Cleared
	No Free Space on ODX Buffer Volume		–	Cleared	Cleared	Cleared	–	Cleared
	SED Network Error Recovered		–	Selected	Selected	Cleared	–	–
	FC CA Port Link Status Changed		–	Cleared	Cleared	Cleared	–	Cleared
	Host Login Over		–	Cleared	Cleared	Cleared	–	Cleared

Selected: Notify
Cleared: Not notify
Selected (fixed): Always notify (This setting cannot be changed with this function.)
–: Not applicable to notification

*1: Host Sense Key Code Qualifier is not notified when pinned data disappears.

REMCS Defaults

The REMCS recommended pattern of event notification is as follows. For the notification methods indicated with "*", notification setting has been changed from the system default.

Item	Notification method					
	Host Sense Key Code Qualifier	SNMP Trap	E-Mail	syslog	REMCS	AIS Connect
All Error Events	Selected/ Cleared	Selected/ Cleared	Selected/ Cleared	Cleared	Selected/ Cleared	Selected/ Cleared
All Warning Events	Cleared *	Cleared *	Cleared *	Cleared	–	Cleared *
All Informational Events	–	Selected/ Cleared	Selected/ Cleared	Cleared	–	Selected/ Cleared
Individual Settings within Severity Level	Yes	Yes	Yes	No	Yes	Yes

Selected: Notify
Cleared: Not notify
Selected/Cleared: Some events are notified and other events are not notified
–: Not applicable to notification

Event		Notification	Remarks
Blink Fault LED at warning		Disable *	
Turn on Fault LED when redundant copy is completed		Disable	
Display parts (except disk) with error status on LCD		Enable	This setting is available only when using the ETERNUS DX8700 S2.
Display parts (except disk) with warning status on LCD		Disable *	
Display disks with error status on LCD	Any Time	Disable *	
	when HS<0	Enable *	
Display disks with warning status on LCD	Any Time	Disable *	
	when HS<0	Disable	

Level	Event		Notification method					
			Host Sense Key Code Qualifier	SNMP Trap	E-Mail	syslog	REMCS	AIS Connect
Error	Parts Error		Selected	Selected	Selected	Cleared	Selected (fixed)	Selected
	Disk Error	Any Time	Cleared *	Cleared *	Cleared *	Cleared	Selected (fixed)	Cleared *
		when HS<0	Cleared	Selected *	Selected *	Cleared	–	Selected *
	Temperature Error		Selected	Selected	Selected	Cleared	Selected (fixed)	Selected
	End of battery life		Selected	Selected	Selected	Cleared	Selected (fixed)	Selected
	Rebuild/Copyback w/ redundant		Cleared *	Cleared	Cleared	Cleared	Cleared	Cleared
	Rebuild/ Copyback w/o redundant	Any Time	Cleared *	Cleared	Cleared	Cleared	Cleared	Cleared
		when HS<0	Selected *	Cleared	Cleared	Cleared	–	Cleared

Level	Event		Notification method					
			Host Sense Key Code Qualifier	SNMP Trap	E-Mail	syslog	REMCS	AIS Connect
Error	Redundant	Any Time	Cleared	Cleared	Cleared	Cleared	Cleared	Cleared
		when HS<0	Cleared	Cleared	Cleared	Cleared	–	Cleared
	Complete Redundant Copy		Cleared	Cleared	Cleared	Cleared	Selected	Selected
	Complete rebuild		Selected	Selected	Selected	Cleared	Selected (fixed)	Selected
	Bad data		Selected	Selected	Selected	Cleared	Selected (fixed)	Selected
	Pinned data		Selected (*1)	Selected	Selected	Cleared	Selected (fixed)	Selected
	Not ready		Selected	Selected	Selected	Cleared	Selected (fixed)	Selected
	Remote Path Error		Selected	Selected	Selected	Cleared	Selected	Selected
	REC Buffer Halt (Path Error)		–	Selected	Selected	Cleared	Selected	Selected
	REC Buffer Halt (Overload)		–	Selected	Selected	Cleared	Selected	Selected
	REC Buffer Halt (Other Error)		–	Selected	Selected	Cleared	Selected	Selected
	Copy Session Error		–	Cleared	Cleared	Cleared	Cleared	Cleared
	Thin Provisioning Pool Rate		–	Selected	Selected	Cleared	–	Cleared
	SED Network Error		–	Selected	Selected	Cleared	–	Cleared
Warning	Parts Warning		Cleared *	Cleared *	Cleared *	Cleared	Selected (fixed)	Cleared *
	Disk Warning	Any Time	Cleared *	Cleared *	Cleared *	Cleared	Selected (fixed)	Cleared *
		when HS<0	Cleared	Cleared	Cleared	Cleared	–	Cleared
	Temperature Warning		Cleared *	Cleared *	Cleared *	Cleared	Selected (fixed)	Cleared *
	Battery life Warning		Cleared *	Cleared *	Cleared *	Cleared	Selected (fixed)	Cleared *
Informational	Recovery module		–	Cleared	Cleared	Cleared	–	Cleared
	Temperature restoration		–	Cleared	Cleared	Cleared	–	Cleared
	User login/logout		–	Cleared	Cleared	Cleared	–	Cleared
	Operated RAID Group		–	Cleared	Cleared	Cleared	–	Cleared
	Added/Released Hot Spare		–	Cleared	Cleared	Cleared	–	Cleared
	Operated Volume		–	Cleared	Cleared	Cleared	–	Cleared
	Power off/on Apply Firmware		–	Cleared	Cleared	Cleared	–	Cleared
	SDP Usage Rate Over Lv1		–	Cleared	Cleared	Cleared	–	Cleared
	SDP Usage Rate Over Lv2		–	Cleared	Cleared	Cleared	–	Cleared
	SDP Usage Rate Over Lv3		–	Cleared	Cleared	Cleared	–	Cleared

Level	Event	Notification method					
		Host Sense Key Code Qualifier	SNMP Trap	E-Mail	syslog	REMCS	AIS Connect
Informational	Copy Table Size Usage Rate Over	–	Cleared	Cleared	Cleared	–	Cleared
	Trial copy license expired	–	Selected	Selected	Cleared	–	Cleared
	No Free Space on ODX Buffer Volume	–	Cleared	Cleared	Cleared	–	Cleared
	SED Network Error Recovered	–	Selected	Selected	Cleared	–	–
	FC CA Port Link Status Changed	–	Cleared	Cleared	Cleared	–	Cleared
	Host Login Over	–	Cleared	Cleared	Cleared	–	Cleared

Selected: Notify
Cleared: Not notify
Selected (fixed): Always notify (This setting cannot be changed with this function.)
–: Not applicable to notification

*1: Host Sense Key Code Qualifier is not notified when pinned data disappears.

11.2.9.2 Display Event Log

This function displays the event history of the ETERNUS DX Disk storage system.
The event log is one of the internal logs stored in the ETERNUS DX Disk storage system. The event log contains a history of events that are related to configuration information changes, such as module failures and volume creation.
Up to 6400 (400 per CM-CPU) event logs can be displayed. Once the recorded event log is no longer required, it can also be deleted.

Caution

Even after deleting the event log using the [Delete Event Log] function, the maintenance information log remains stored in the ETERNUS DX Disk storage system.

Note

All event logs are deleted in a single operation.

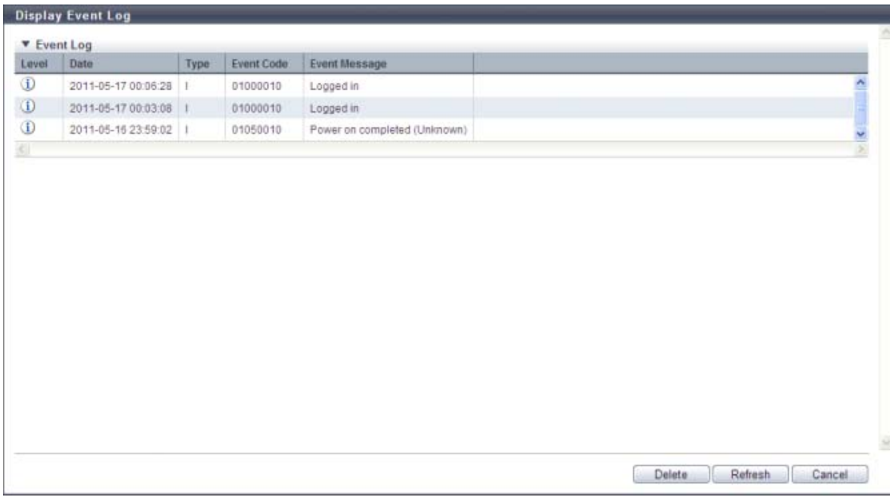
Display event logs

The procedure to display event logs is as follows:

Procedure

1 Click [Display/Delete Event Log] in [Action].

2 Check the displayed event logs.



- Level
  The event level is displayed with an icon.
  - (Information)
    This icon indicates that the level of importance of the log is "Information".
  - (Warning)
    This icon indicates that the level of importance of the log is "Warning".
  - (Error)
    This icon indicates that the level of importance of the log is "Error".
- Date
  The date and time when the event occurs are displayed.
  - YYYY-MM-DD hh:mm:ss (YYYY: Year (AD), MM: Month (01 - 12), DD: Day (01 - 31), hh: Hour (00 - 23), mm: Minute (00 - 59), ss: Second (00 - 59))
- Type
  The event level is displayed using the following symbols.
  - I
  - J
  - P
  - M
  - R
  - O (Other)
- Event Code
  The event code is displayed.
- Event Message
  The detailed event information is displayed.

Note

Click the [ ] icon to display the latest screen.

3 Click the [Cancel] button to return to the [Display Event Log] screen.

End of procedure

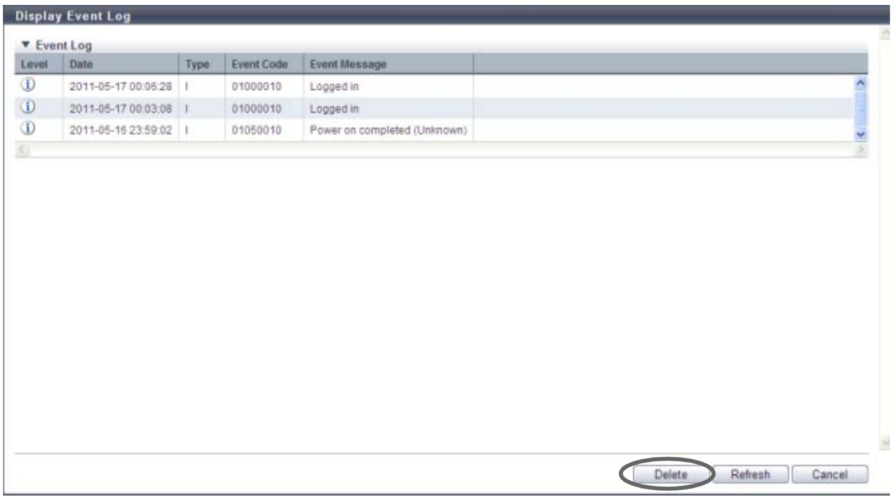
Delete event logs

The procedure to delete event logs is as follows:

Procedure

1 Click [Display/Delete Event Log] in [Action].

2 Click the [Delete] button.



→ A confirmation screen appears.

3 Click the [OK] button.



→ Deletion of event logs starts.

4 Click the [Done] button to return to the [Event/Dump] screen.

End of procedure

11.2.9.3 Export/Delete Log

This function exports and saves the ETERNUS DX Disk storage system maintenance information (log) in accordance with user-specified time settings.
An exported log can be stored on a floppy disk or hard disk, or sent by E-mail.
Also, users can select a log segment size to suit the destination it is to be saved.

- The maintenance information to be exported
  Log to be exported includes an "internal log" and "configuration information".
  - Internal log
    Detected errors, warnings, and traces
  - Configuration definition information
    Configuration information exported from the ETERNUS DX Disk storage system

Caution

- The internal log and configuration information cannot be exported separately.
- When exporting of the log has been completed, save the log file immediately.
- The various pieces of maintenance information are combined together, compressed, and then segmented into the user specified segment size before being exported.
  Special tools to read these logs are required.

The procedure to export log is as follows:

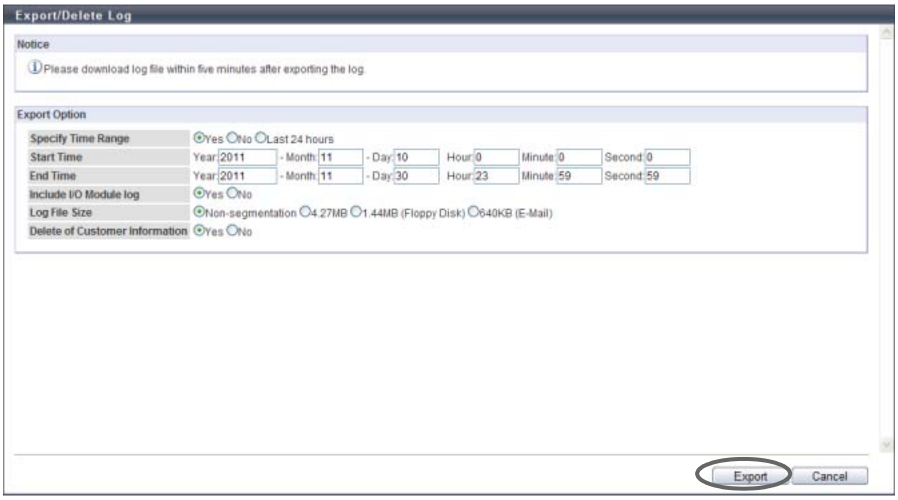
Procedure

1 Click [Export/Delete Log] in [Action].

2 Set the detailed information for exporting a log, and click the [Export] button.

- Specify Time Range
  To specify a time range for exporting logs, select "Yes". Select "No" if not specifying. To export logs from the last 24 hours, select the "Last 24 hours".
- Start Time
  When a time range is to be specified, specify the date and time to start exporting logs.
  - YYYY-MM-DD hh:mm:ss (YYYY: Year (AD), MM: Month (01 - 12), DD: Date (01 - 31), hh: Hour (00 - 23), mm: Minute (00 - 59), ss: Second (00 - 59))
- End Time
  When a time range is to be specified, specify the date and time to finish exporting logs.
  - YYYY-MM-DD hh:mm:ss (YYYY: Year (AD), MM: Month (01 - 12), DD: Date (01 - 31), hh: Hour (00 - 23), mm: Minute (00 - 59), ss: Second (00 - 59))
- Include I/O Module log
  When exporting the I/O module logs, select "Yes". When not exporting, select "No".
- Log File Size
  Select the log file size (segment size) when saving the exported log from the following.
  - Non-segmentation
  - 4.27MB
  - 1.44MB (Floppy Disk)
  - 640KB (E-Mail)

- Delete of Customer Information
  When deleting the customer information (information to identify the customer such as; user name, box ID and IP address) from the exported log, select "Yes". When not deleting, select "No".



→ A confirmation screen appears.

Caution

When clicking the [Export] button in the following conditions, an error screen appears.

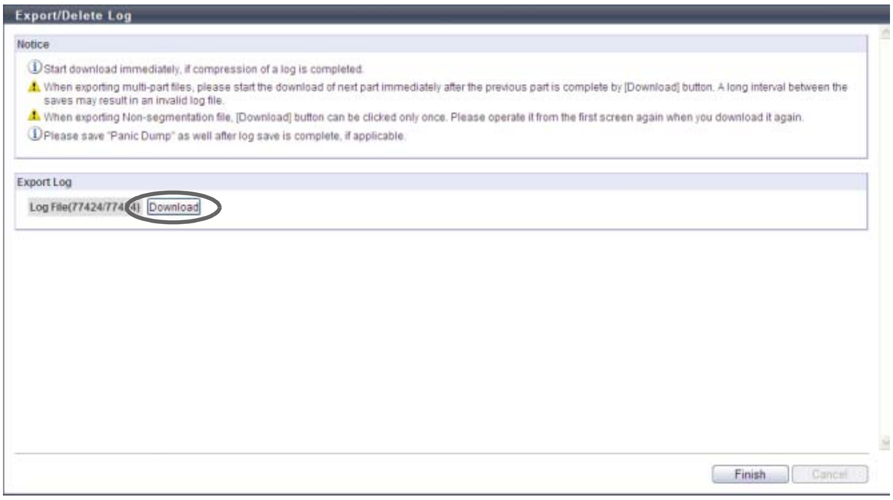
- When the input date and/or time are not valid (For example: February 31st)
- When the end time is earlier than the start time

3 Click the [OK] button.



→ Export log starts. The progress screen is displayed. After the log export is finished, a screen to execute downloading the file is displayed.

4 Click the [Download] button to save the exported log.



→ A dialog box to download the file appears.

Caution

When exporting of the log has been completed, save the log file immediately.

Note

If "Non-segmentation" is selected in the "Log File Size" field, the [Download] button becomes inactive after the log file has been saved. Proceed to Step 5.

5 Save the log file.

The default file name is "Log_serial number for the ETERNUS DX Disk storage system_YYYY-MM-DD_hh-mm-ss_serial number for log file.zlg".
(YYYY-MM-DD_hh-mm-ss: the date and time when the download screen (Step 4) is displayed. When a log file is segmented, the segmented log files are given the same name and numbered serially (01 -).)
→ If the log file is segmented, download and save the next segment (save all the segmented files).

Caution

When exporting segmented log files, make sure to export the segment within five minutes. If five minutes passes before exporting the next segment, the log export fails. After finishing saving each segment, save the following segment immediately.

6 Click the [Finish] button to return to the [Event/Dump] screen.

→ Exporting log has been completed.

Caution

When exporting of the log has been completed, make sure to export a panic dump.

End of procedure

11.2.9.4 Export Panic Dump

"Panic Dump" is the action of outputting (dump) memory information when an error (panic) occurs, and also the name of the output information itself. This function exports and saves the memory information of the Controller Module that is stored in the panic dump data, in a segment size specified by the user. An exported panic dump can be stored on a floppy disk or hard disk, or sent by E-mail.
Panic dump is used to analyze the cause of a firmware abnormality or hardware error.

Caution

- This function cannot be used when there is no panic dump to be exported in the ETERNUS DX Disk storage system.
- Up to two panic dumps can be stored in a single CM.

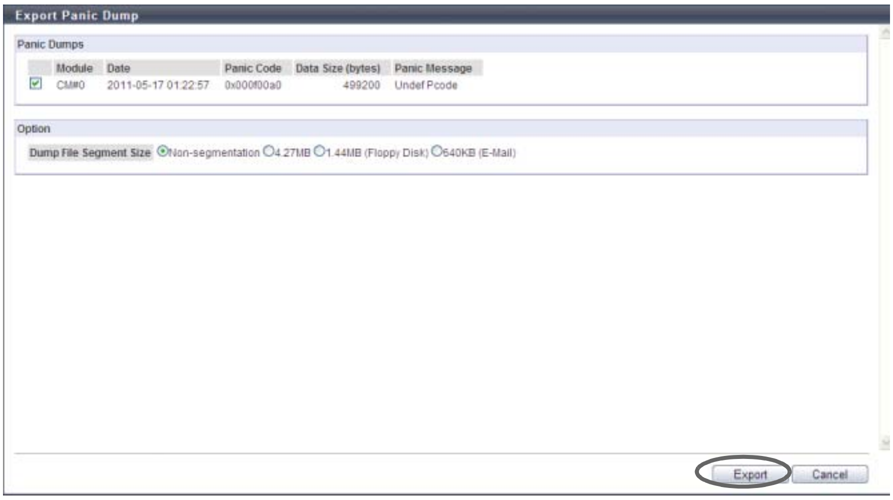
The procedure to export the panic dump is as follows:

Procedure

1 Click [Export Panic Dump] in [Action].

2 Specify the panic dump to be exported and the segment file size, and click the [Export] button.

- Panic Dumps
  Select a checkbox for the panic dump to be exported (only one panic dump can be selected).
- Dump File Segment Size
  Select the file size (segment size) when saving the exported panic dump from the following:
  - Non-segmentation
  - 4.27MB
  - 1.44MB (Floppy Disk)
  - 640KB (E-Mail)



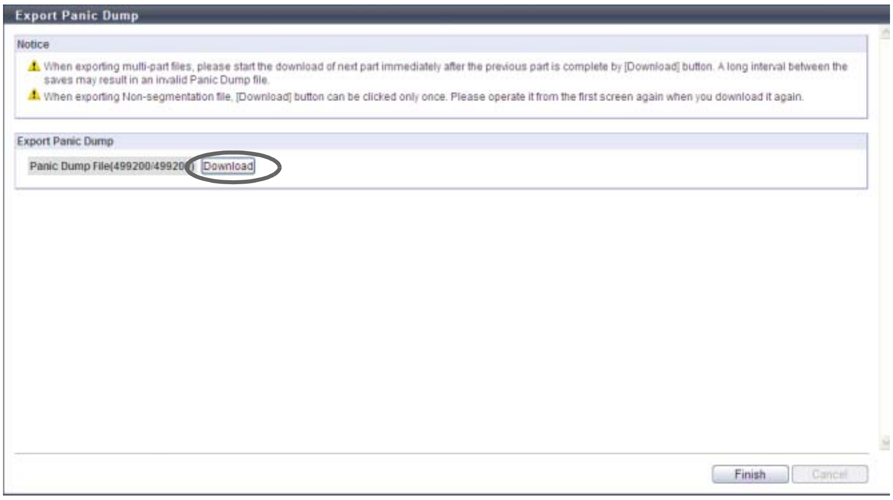
→ A confirmation screen appears.

3 Click the [OK] button.



→ Exporting of the panic dump starts. The progress screen is displayed. After the panic dump export is finished, a screen to execute downloading the file is displayed.

4 Click the [Download] button to save the exported panic dump.



→ A dialog box to download the file appears.

Caution

When exporting of the panic dump has been completed, save the panic dump immediately.

Note

If "Non-segmentation" is selected in the "Dump File Segment Size" field, the [Download] button becomes inactive after the log file has been saved. Proceed to Step 5.

5 Save the panic dump.

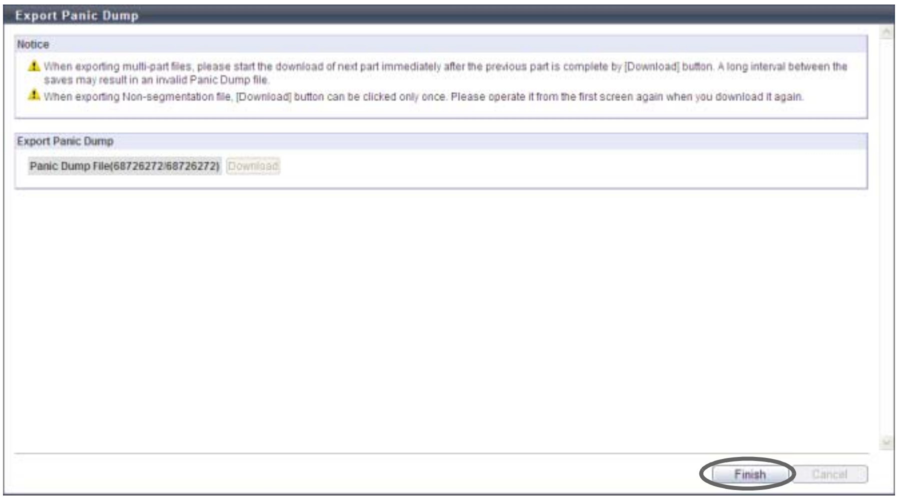
The default file name is "Panic_serial number for the ETERNUS DX Disk storage system_YYYY-MM-DD_hh-mm-ss_CMx_serial number for panic dump file.zlg".
(YYYY-MM-DD_hh-mm-ss: the date and time when the panic has occurred. x: CM number in which the panic has occurred. When a panic dump file is segmented, the segmented panic dump files are given the same name and numbered serially (01 -).)

→ If the panic dump file is segmented, download and save the next segment (save all the segmented files).

Caution

When saving segmented panic dump files, make sure to save the segment within five minutes. If five minutes passes before exporting the next segment, the panic dump export fails. After finishing saving each segment, save the following segment immediately.

6 Click the [Finish] button.



→ A confirmation screen appears.

7 Click the [OK] button to return to the [Event/Dump] screen.

End of procedure

11.2.10 Audit Log Management

This section describes audit log management.
The following functions are available with Audit log management:

- Enable Audit Log
- Disable Audit Log
- Setup Audit Log

11.2.10.1 Enable Audit Log

This function enables the audit log function.

Caution

- Enable the "Audit Log" setting, and then specify the destination external server. Refer to "11.2.10.3 Setup Audit Log" (page 903) for details. Audit logs are sent after the external server is specified.
- Note that the ETERNUS DX Disk storage system does not save the audit log. The audit log is only sent to the specified external server.

Note

The conditions for collecting audit logs are as follows:

- The interface must be GUI, CLI, or software that accesses the ETERNUS DX Disk storage system via CLI or SMI-S
- The user who logs in or is newly logged in when the external server is set after the "Audit Log" is enabled
- Audit log collection target operations (*1)

*1: Refer to "11.1.9 Audit Log" (page 728) for details about log collection target operations.

The procedure to enable the audit log function is as follows:

Procedure

1 Click [Enable Audit Log] in [Action].

→ A confirmation screen appears.

Caution

If the audit log function has already been enabled, [Enable Audit Log] cannot be clicked.

2 Click the [OK] button.



→ Enabling of the audit log starts.

3 Click the [Done] button to return to the [Audit Log] screen.

End of procedure

11.2.10.2 Disable Audit Log

This function disables the audit log function.

The procedure to disable the audit log function is as follows:

Procedure

1 Click [Disable Audit Log] in [Action].

→ A confirmation screen appears.

> **Caution**
>
> If the audit log function has already been disabled, [Disable Audit Log] cannot be clicked.

2 Click the [OK] button.



→ Disabling of the audit log starts.

3 Click the [Done] button to return to the [Audit Log] screen.

End of procedure

11.2.10.3 Setup Audit Log

This function sets up external servers (Syslog servers) for sending audit logs that are detected by the ETERNUS DX Disk storage system.
Up to two Syslog servers can be registered.

> **Caution**
>
> - Enable the "Audit Log" setting, and then configure the destination Syslog server. Audit logs are sent after the Syslog server is specified.
> - Confirm that the audit log has been successfully sent to the Syslog server by logging in and out from GUI or CLI and performing a transmission test to the Syslog server.
> - Even if a communication error occurs between the ETERNUS DX Disk storage system and the Syslog server, the audit log is not sent again.
> - Changing the Syslog server setting is only available when the "Audit Log" setting is "Enable". Note that once "on" is selected for the "Send Audit Log" setting, the "Send Audit Log" setting cannot be changed to "off" for both of the Syslog servers (at least one Syslog server must be "on").

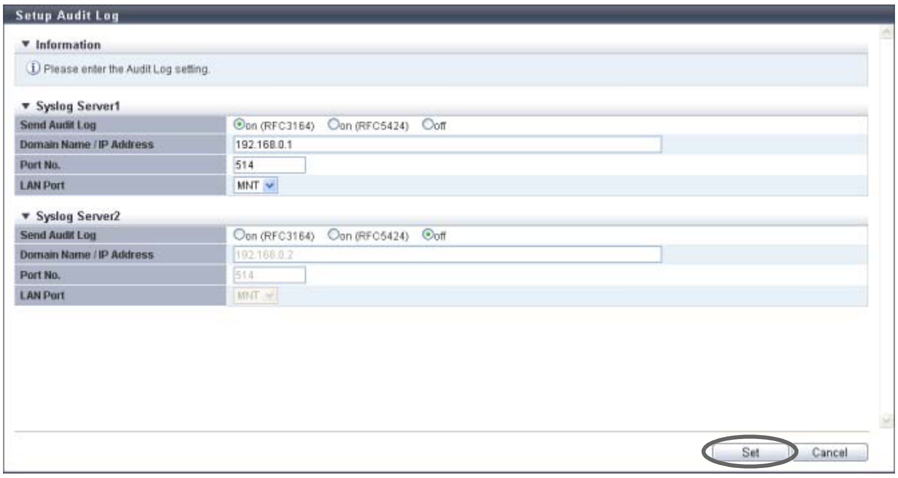
Note

- The audit log function uses the destination server that has the same interface as the Syslog server. The same server as the Syslog server is also available.
- The audit logs are sent to both Syslog servers at the same time.
- Even if the "Audit Log" setting changed to "Disable", the audit log setting information in the ETERNUS DX Disk storage system is maintained.

The procedure to set up the servers for sending audit logs is as follows:

Procedure

1. Click [Setup Audit Log] in [Action].
2. Specify the parameters, and click the [Set] button.
   - Send Audit Log
     Select from "on (RFC3164)", "on (RFC5424)", or "off" for the audit log sending.
     Logs are send in the selected RFC message format.
   - Domain Name / IP Address
     Input the domain name or the IP address of the Syslog server.
     There are two methods to specify an IP address; "IPv4" and "IPv6". The following IPv6 addresses can be used; "link local address", "global address", "unique local address", and "6to4 address". Refer to "Available IPv6 Address" (page 757) for details.
     When the current setting is displayed, the IPv6 address is displayed as an abbreviation.
     The following input conditions apply:
     - For "Domain Name"
       Up to 63 alphanumeric characters and symbols
     - For IPv4 address
       xxx.xxx.xxx.xxx
       xxx: 1 - 255 for the top field (decimal)
       xxx: 0 - 255 for other fields (decimal)
     - For IPv6 address
       xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
       xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
       Refer to "IPv6 Address Notation" (page 378) for details.
   - Port No.
     Input the port number used to send an audit log.
     The following input conditions apply:
     - Numeric characters
     - "1" - "65535"
   - LAN Port
     Select the LAN port from "MNT" or "RMT" that is to be used to send an audit log.



→ A confirmation screen appears.

Note

Up to two Syslog servers can be configured. When configuring a second Syslog server, specify the required parameters in "Syslog Server2".

3 Click the [OK] button.



→ Setting of the audit log starts.

Caution

An error screen appears in the following conditions:

- When the "Audit Log" setting is "Disable"
- When the specified IP address of the Syslog server conflicts with the internal IP address of the ETERNUS DX Disk storage system.

4 Click the [Done] button to return to the [Audit Log] screen.

End of procedure

11.2.11 Storage Migration Management

This section describes Storage Migration management.
Storage Migration management provides the following functions:

- Start Storage Migration
- Download Template File for Storage Migration Settings
- Delete Storage Migration Path
- Download Storage Migration Result
- Restart Storage Migration
- Suspend Storage Migration
- Stop Storage Migration

11.2.11.1 Start Storage Migration

This function loads the Storage Migration setting file and starts migration.
Storage Migration is the function for migrating data by connecting other storage systems (migration source) and the ETERNUS DX disk storage system (migration destination). Data migration is possible regardless of the server and the OS, and without using server resources.

- Data migration is performed in volume units.
- Up to 16 storage systems can be specified as migration source storage systems.
- Up to 8 migration paths can be specified per migration source storage system.
- Up to 512 data migration LUNs can be specified per migration path.

To perform Storage Migration, the destination storage systems, the source storage systems, and the destination volumes must satisfy the conditions below.

Requirements for a source storage system and a source LUN:

- An FC interface is available as the host interface
- The storage system is in normal status
- FC ports can be only used for data migration
- The migration source LUN is a type that is accessible from the host (Standard, TPV, SDV, etc.)
- Storage Migration is not yet started

Requirements for a destination storage system and a destination volume:

- An FC interface is available as the host interface
- The storage system is in normal status
- The CA port used for migration is in normal status
- The destination volume is in normal status
- The type of the destination volume is "Standard", "WSV", "TPV", or "FTV"
- The destination volume has the same or larger capacity than the source LUN
- The mirroring reservation attribute (*1) is not applied to the destination volume

  *1: The mirroring reservation attribute is applied to the volumes that are being created as an REC copy path by the Dynamic LUN Mirroring function. Volumes that are not successfully created may have this attribute. Volumes that have the mirroring reservation attribute can be checked in the "Forbid Advanced Copy" field on the [Volume] screen. Refer to "5.1.1 Volume (Basic Information)" (page 74) for details.

- A storage system or volume cannot be specified as the destination in the following cases:
  - Concurrent upgrade of firmware is in progress at the destination storage system
  - The RAID group to which the destination volume belongs to has an ECO mode schedule configured
  - The Thin Provisioning Pool (TPP) to which the destination volume belongs has an ECO mode schedule configured
  - The destination volume is specified as a RAID migration source or destination
  - The capacity of the RAID group to which the destination volume belongs is being expanded
  - Encryption is in progress for the destination volume
  - The capacity of the destination volume is being expanded
  - The destination volume is specified as the destination for another Storage Migration operation
  - An ODX Buffer volume is selected as a migration destination volume

Caution

- Stop access from the host to both the source LUN and destination volume.
  When "Migration + Full Compare" or "Full Compare" is specified for the operation mode, stop the host access to all of the volumes in the migration destination storage system.
- Do not specify a volume that has copy sessions as a source or destination.
- Do not specify a volume as the source when formatting is in progress.
- Do not execute the [Start RAID Group Diagnosis] function or the [Start Disk Diagnosis] function on the destination storage system.
- When "Migration + Full Compare" or "Full Compare" is specified for the operation mode, the time to complete the operation after data migration is increased significantly.

Note

- Download a template to create a Storage Migration setting file. Refer to "11.2.11.2 Download Template File for Storage Migration Settings" (page 912) for details.
- Change the mode of the FC port that is used on the destination storage system to "Initiator". Refer to "9.2.3.11 Modify Port Mode" (page 571) for details.
- Specify detailed parameters for the FC-Initiator port that is used on the destination storage system. Refer to "9.2.3.7 Modify FC Port Parameters" (page 531) for details.
- A started Storage Migration can be suspended, restarted, and stopped in volume units. Refer to "11.2.11.6 Suspend Storage Migration" (page 917), "11.2.11.5 Restart Storage Migration" (page 916), or "11.2.11.7 Stop Storage Migration" (page 918) for details.

Data migration flow using the Storage Migration function

The workflow sequence for Storage Migration is described below.
The host environment must be confirmed and saved before performing the Storage Migration. Ask the system administrator to do it.

(1) Preparation

a Check and save the host environment so that the ETERNUS DX disk storage system can be used in the same environment after migration.

b Check the status of the source and destination storage systems and clear any sense information that has not been reported (*1).

c When migrating data with multipath, make the configuration so that the same affinity group (LUN group) can be accessed from the multiple FC ports used for migration at the source storage system.

d Create a destination volume in the destination storage system, or format an existing volume for use as the destination volume.

(2) Download a template for the Storage Migration setting file ("11.2.11.2 Download Template File for Storage Migration Settings" (page 912)).

(3) Create the Storage Migration setting file. Refer to "Appendix I Storage Migration Setting Files" (page 1019) for details.

(4) Stop access from the host to the source volume.

(5) Change the mode of the FC port used for migration in the destination storage system to "Initiator" ("9.2.3.11 Modify Port Mode" (page 571)).

(6) Set port parameters to the FC-Initiator port ("9.2.3.7 Modify FC Port Parameters" (page 531)).

(7) Connect the source and destination storage systems using an FC cable, or use a switch to connect the source and destination storage systems.

(8) Load the "Storage Migration setting file" that has been created in Step (3) to start Storage Migration ("11.2.11.1 Start Storage Migration" (page 906)).

(9) Check the progress of Storage Migration.

(10) Operation after Storage Migration is complete:

a Delete the migration path after Storage Migration is completed successfully ("11.2.11.3 Delete Storage Migration Path" (page 914)).

b Change the FC-Initiator port mode from "Initiator" to "CA" ("9.2.3.11 Modify Port Mode" (page 571)).

c Set port parameters to the FC-CA port ("9.2.3.7 Modify FC Port Parameters" (page 531)).

d Set host affinity to the FC-CA port ("9.2.1.1 Create Host Affinity" (page 414) or "9.2.1.3 Modify Host Affinity" (page 428)).

e Confirm that the destination storage system and volumes can be accessed correctly from the host.

*1: Operations that can be performed when logged in using a user account with the "Maintenance Operation" policy.

The procedure to start Storage Migration is as follows:

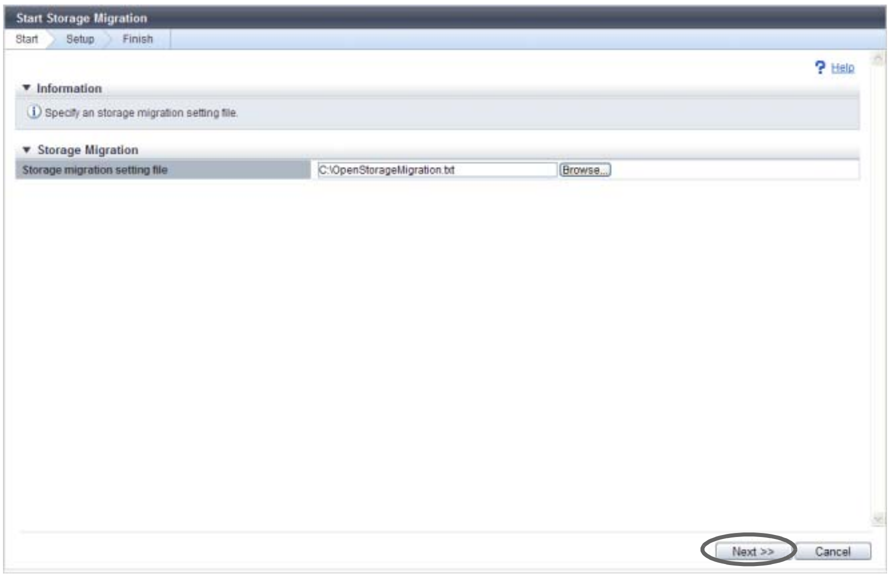
Procedure

1 Click [Start] in [Action].

2 Click the [Browse...] button to select a Storage Migration setting file, and click the [Next >>] button.

- Storage migration setting file
  Input the location where the Storage Migration setting file is stored.
  Click the [Browse...] button to specify the location, or input the location directly.
  There are two types of template files for Storage Migration setting; new format (*1) template files and old format (*1) template files. Storage Migration setting files in both formats can be used when the controller firmware version is V10L30 or later.

  *1: A template file in the new format can be downloaded when the controller firmware version is V10L30 or later. A template file in the old format can be downloaded when the controller firmware version is older than V10L30. Refer to "11.2.11.2 Download Template File for Storage Migration Settings" (page 912) for details.

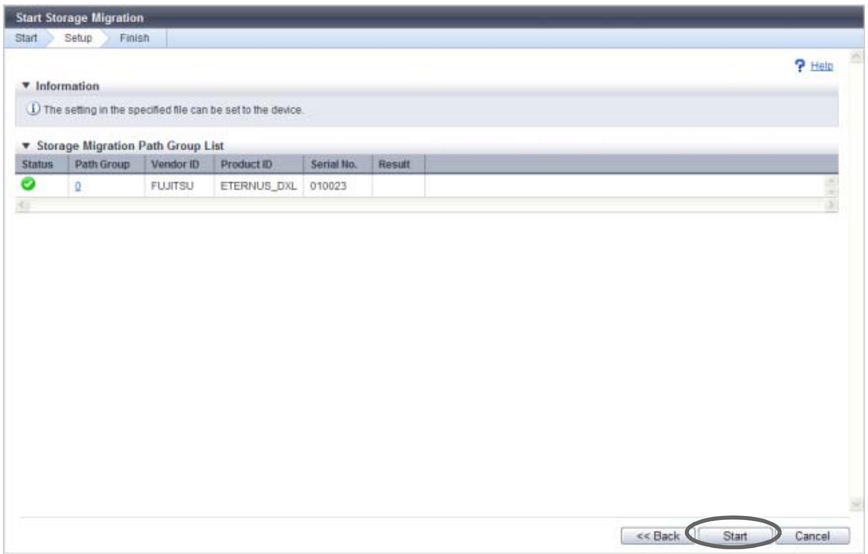


Caution

- An error screen is displayed when a timeout occurs during the retrieval of destination device information.
- An error screen is displayed when the Storage Migration setting file is in the following conditions:
  - The Storage Migration setting file is not specified
  - A character code other than the space or tab is placed before the keyword on the left of "="
  - The number of the parameters on the right of "=" does not coincided with the specified number of parameters of the keyword
  - The identification code is invalid (only when using a Storage Migration setting file with the new format)
  - "Type" is not "Open"
  - The "GROUP" is in the following conditions
    - Invalid characters are input
      - When a value other than a 1-digit hexadecimal number is input for a Storage Migration setting file in the old format
      - When a value other than a 1-digit hexadecimal number is input after the "0x" prefix for a Storage Migration setting file in the new format
    - Out of range (not in the 0 - F range)
    - The same value is duplicated in the Storage Migration setting file
  - The Operation mode is not one of the following items: "M", "M+QC", "M+FC", "QC", "FC"
  - The destination CA port being set for "PATH" is in the following conditions:
    - The setting is not correct
    - The mode is not "Initiator"
    - The status is abnormal
    - The same value is duplicated in the Storage Migration setting file
    - The value is already used in a Storage Migration in execution.
  - The source WWN being set for "PATH" is in the following conditions:
    - The number of characters is not 16
    - The value is out of range
    - The first character is "0" or all characters are "F"
    - The same value is duplicated in the Storage Migration setting file
  - The source LUN is in the following conditions:
    - Invalid characters are input
      - When inputting a value other than 4-digit hexadecimal number for a Storage Migration setting file with the old format
      - When the Storage Migration setting file is in the new format and the one of the following conditions applies to the value that is input:
        - The value is not a decimal or hexadecimal number
        - The value is a decimal number that exceeds 256
        - The value is not a 4-digit or 16-digit hexadecimal number
    - The same value is duplicated in the Storage Migration setting file

- The destination volume is in the following conditions:
    - Invalid characters are input
        - When inputting a value other than 4-digit hexadecimal number for a Storage Migration setting file with the old format
        - When inputting a value that is not a decimal number or a 4-digit hexadecimal number for a Storage Migration setting file in the new format
    - The volume number is out of range
    - Not specified
    - The status is abnormal
    - The volume type is not "Standard", "WSV", "TPV", or "FTV".
    - The same value is duplicated in the Storage Migration setting file
    - The value is already used in a Storage Migration in execution
- When an error is detected in the script analysis
- An error screen is displayed when the obtained destination device information is in the following conditions:
    - When two or more source storage systems are specified in single "GROUP".
    - The source storage system has other Storage Migration instance already started.
    - When the source storage system status is not normal
    - The source WWN being set for "PATH" does not exist
    - The source LUN is in the following conditions:
        - The source device information is not exist.
        - An unusable status is detected.
        - The capacity exceeds that of the destination volume.

3 Check the path group, and click the [Start] button.



→ A confirmation screen appears.

Note

Click the [Path Group] link to display the [Path Group Detail Information] screen. Refer to "11.1.14 Path Group Detail Information" (page 734) for display items.

4 Click the [OK] button.



→ Storage Migration starts.

5 Click the [Done] button to return to the [Storage Migration] screen.

Note

- Refer to the [Storage Migration] screen for progress status of Storage Migration.
- Click the [Path Group] link to display the "11.1.14 Path Group Detail Information" (page 734).

End of procedure

11.2.11.2 Download Template File for Storage Migration Settings

This function downloads the template of the Storage Migration setting file.
In the Storage Migration setting file, specify the destination CA port, source WWN, source LUN, and destination volumes.

Note

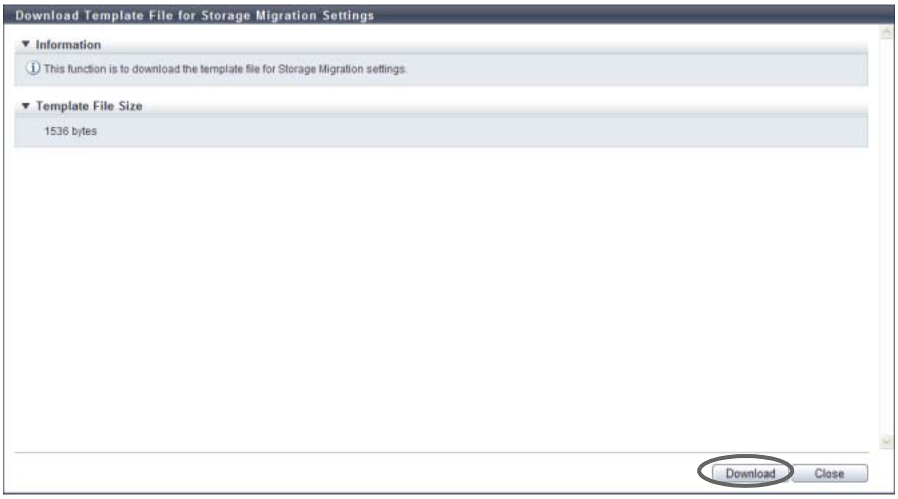
- There are two types of template files for Storage Migration; new format template files and old format template files. A template file in the new format can be downloaded when the controller firmware version is V10L30 or later. A template file in the old format can be downloaded when the controller firmware version is older than V10L30. A template file with the new format supports the following items:
  - The operation mode for the Storage Migration can be specified.
  - If a source LUN is between "0" and "255", the source LUN can be specified with a decimal number.
  - Destination volumes can be specified with decimal numbers.
- To distinguish between a new format and an old format template file, check whether the identification code "eternus-storage-migration-0101" is included. A template file with the new format has an identification code. Identification codes are not included in old format template files.
- Refer to "Appendix I Storage Migration Setting Files" (page 1019) for details about the Storage Migration setting files.

The procedure to download the template is as follows:

Procedure

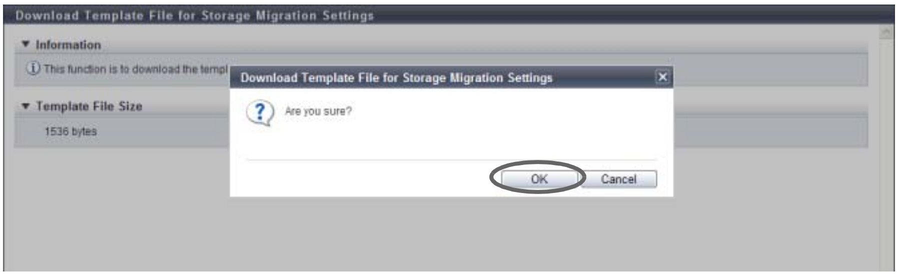
1 Click [Download Template] in [Action].

2 Click the [Download] button.



→ A confirmation screen appears.

3 Click the [OK] button.



→ A dialog box to download file appears.

4 Save the template file.

The default file name is "StMigTemplate.txt".
→ Downloading of the template file starts.

5 Click the [Close] button to return to the [Storage Migration] screen.

End of procedure

11.2.11.3 Delete Storage Migration Path

This function deletes path groups for Storage Migration.

Caution

The path groups must be deleted after the data migration is complete. The following operations are not available before path groups are deleted:

- Concurrent upgrade of firmware at the destination storage system
- ECO mode schedule setting of the RAID group to which the destination volume belongs
- ECO mode schedule setting of the Thin Provisioning Pool (TPP) to which the destination volume belongs
- Capacity expansion of the RAID group to which the destination volume belongs
- RAID migration of the destination volume
- Encryption of the destination volume
- Capacity expansion of the destination volume
- Deletion of the destination volume
- Port mode modification of the destination FC-Initiator port
- Port parameter setting of the destination FC-Initiator port
- Reduction of the CA to which the destination FC-Initiator port belongs

Note

The path group can be deleted if all configured paths are in any of the following state:

- "Source LUN Status" of the Storage Migration Volume List is " Not Exist".
- "Migration Status" of the Storage Migration is "Normal End", "Stop", "Initial", or "Waiting".

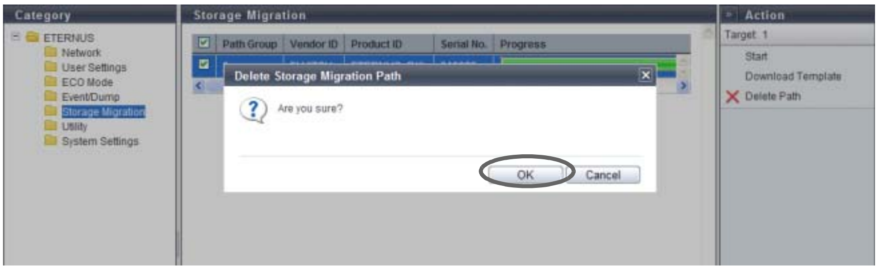
The procedure to delete the Storage Migration path is as follows:

Procedure

1 Select the path group that is to be deleted (multiple selections can be made) and click [Delete Path] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ Deletion of the Storage Migration path starts.

3 Click the [Done] button to return to the [Storage Migration] screen.

End of procedure

11.2.11.4 Download Storage Migration Result

This function downloads the execution result of the Storage Migration.

Note

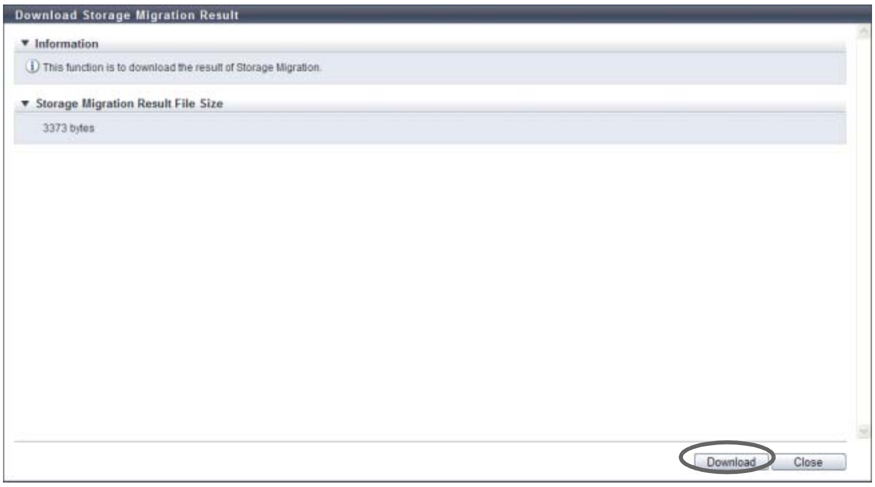
- Download of Storage Migration results is made in path group units.
- Storage Migration results can be downloaded not only after completion of data migration but also during data migration.
- The Storage Migration results are text files. The template is the same as the [Path Group Detail Information] screen. Refer to "11.1.14 Path Group Detail Information" (page 734) for details.

The procedure to download the Storage Migration result is as follows:

Procedure

1 Click [Download Result] in [Action].

2 Click the [Download] button.



→ A confirmation screen appears.

3 Click the [OK] button.



→ A dialog box to download file appears.

4 Save the Storage Migration result file.

The default file name is "StMigResult_serial number for the ETERNUS DX Disk storage system_YYYY-MM-DD_hh-mm-ss.txt".
(YYYY-MM-DD_hh-mm-ss: the date and time when the download screen (Step 2) is displayed.)
→ Downloading of the Storage Migration result file starts.

5 Click the [Close] button to return to the [Path Group Detail Information] screen.

End of procedure

11.2.11.5 Restart Storage Migration

This function restarts Storage Migration when it is suspended, stopped, or error-stopped.

Note

- Storage Migration is restarted in volume units.
- Storage Migration can be restarted when its "Migration Status" is "Suspend", "Stop" or "Error".
- If Storage Migration is restarted when its "Migration Status" is "Suspend" or "Error", data migration is started from the point of LUN suspension.
- If Storage Migration is restarted when its "Migration Status" is "Stop", data migration of the LUN is started over from scratch.

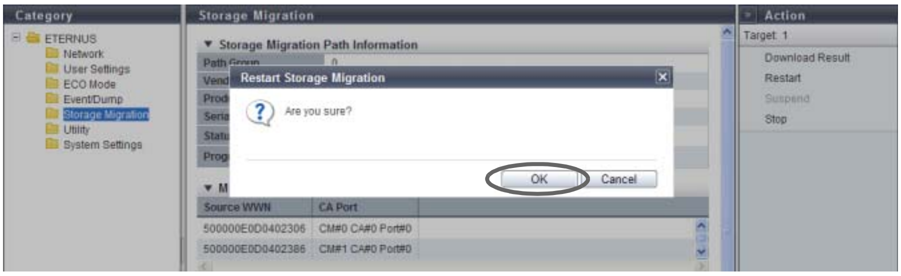
The procedure to restart the Storage Migration is as follows:

Procedure

1 Select the source LUN from which Storage Migration is to be restarted (multiple selections can be made) and click [Restart] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ Storage Migration restarts.

Note

[Restart] cannot be clicked if one or more source LUNs are selected for which the migration status is unavailable for restarting. Note that if the migration status of some LUNs changes to unavailable status after clicking [Restart], only the available LUNs among the selected LUNs are restarted. If LUNs for which the migration status is not unavailable for restarting exist, a message that indicates that the restarting process for these LUNs failed is displayed.

3 Click the [Done] button to return to the [Path Group Detail Information] screen.

End of procedure

11.2.11.6 Suspend Storage Migration

This function suspends Storage Migration that is awaiting migration or running.

Note

- Storage Migration is suspended in volume units.
- Storage Migration can be suspended when its "Migration Status" is "Waiting" or "Running".
- A suspended Storage Migration can be restarted. Refer to "11.2.11.5 Restart Storage Migration" (page 916) for details.

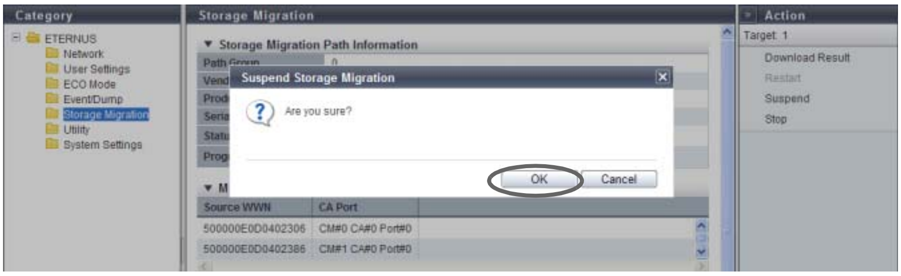
The procedure to suspend the Storage Migration is as follows:

Procedure

1 Select the source LUN for which Storage Migration is to be suspended (multiple selections can be made) and click [Suspend] in [Action].

→ A confirmation screen appears.

2 Click the [OK] button.



→ Storage Migration suspends.

Note

[Suspend] cannot be clicked if one or more source LUNs are selected for which the migration status is unavailable for suspending. Note that if the migration status of some LUNs changes to unavailable status after clicking [Suspend], only the available LUNs among the selected LUNs are suspended. If LUNs for which the migration status is not unavailable for suspending exist, a message that indicates that the suspending process for these LUNs failed is displayed.

3. Click the [Done] button to return to the [Path Group Detail Information] screen.

End of procedure

11.2.11.7 Stop Storage Migration

This function stops Storage Migration when it is awaiting, migrating, suspended, or error-stopped.

Note

- Storage Migration is stopped in volume units.
- Storage Migration can be stopped when its "Migration Status" is "Waiting", "Running", "Suspend" or "Error".
- A stopped Storage Migration can be restarted. Refer to "11.2.11.5 Restart Storage Migration" (page 916) for details.

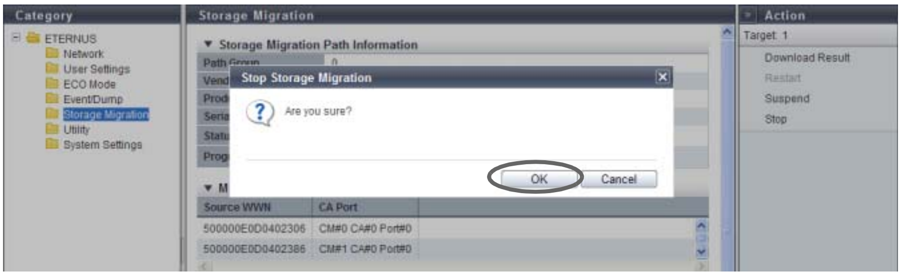
The procedure to stop the Storage Migration is as follows:

Procedure

1. Select the source LUN for which Storage Migration is to be stopped (multiple selections can be made) and click [Stop] in [Action].

   → A confirmation screen appears.

2. Click the [OK] button.



   → Storage Migration stops.

Note

[Stop] cannot be clicked if one or more source LUNs are selected for which the migration status is unavailable for stopping. Note that if the migration status of some LUNs changes to unavailable status after clicking [Stop], only the available LUNs among the selected LUNs are stopped. If LUNs for which the migration status is not unavailable for stopping exist, a message that indicates that the stopping process for these LUNs failed is displayed.

3 Click the [Done] button to return to the [Path Group Detail Information] screen.

End of procedure

11.2.12 Utility Management

This section describes utility management.
Utility management provides the following functions:

- Shutdown/Restart Storage System
- Backup Configuration
- Export Configuration
- Start/Stop Performance Monitoring

11.2.12.1 Shutdown/Restart Storage System

When the ETERNUS DX disk storage system cannot be shut down directly, perform the shutdown or restart on the screen.

Caution

- This function can be used regardless of whether the "Setup Power Management" is enabled or disabled.
- Note that the ETERNUS DX Disk storage system may reboot automatically when "Setup Power Management" is enabled. For example, an ETERNUS DX Disk storage system that is turned off reboots when receiving a power on request from a server during turning off the power.
- This function cannot be used when the ETERNUS DX Disk storage system is in the machine down status. Restart the browser after completion of the process, and then access the login screen after rebooting of the ETERNUS DX Disk storage system is complete.

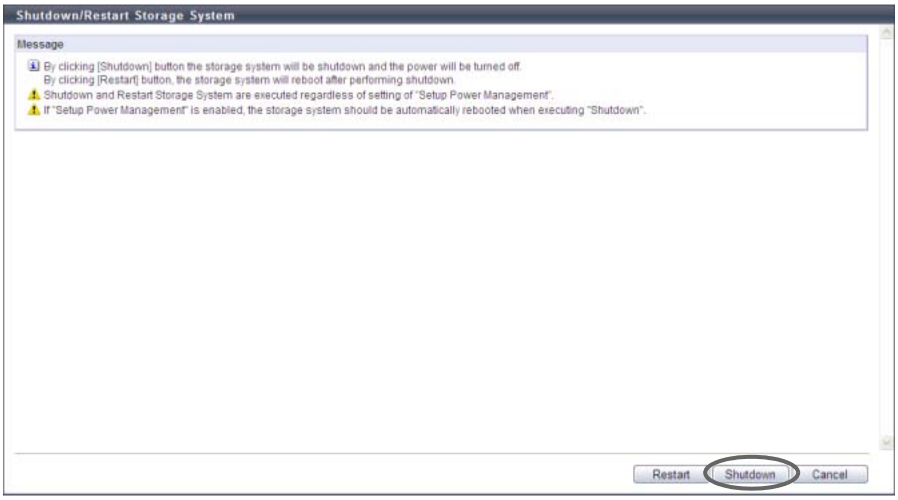
Shutdown the ETERNUS DX Disk storage system

The procedure to shut down the ETERNUS DX Disk storage system is as follows:

Procedure

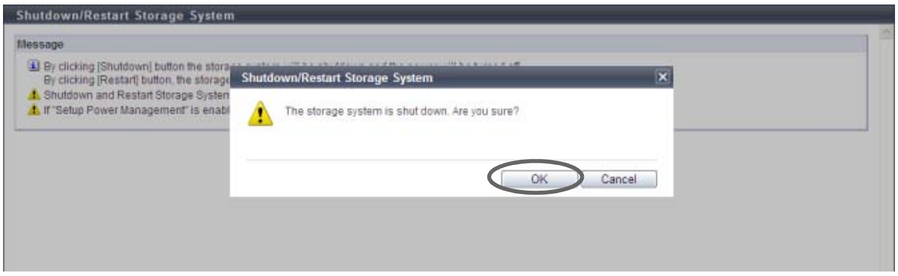
1 Click [Shutdown/Restart] in [Action].

2 Click the [Shutdown] button.



→ A confirmation screen appears.

3 Click the [OK] button.



→ The ETERNUS DX disk storage system shuts down after 30 seconds.

Caution

Note that the ETERNUS DX Disk storage system may reboot automatically when "Setup Power Management" is enabled.

End of procedure

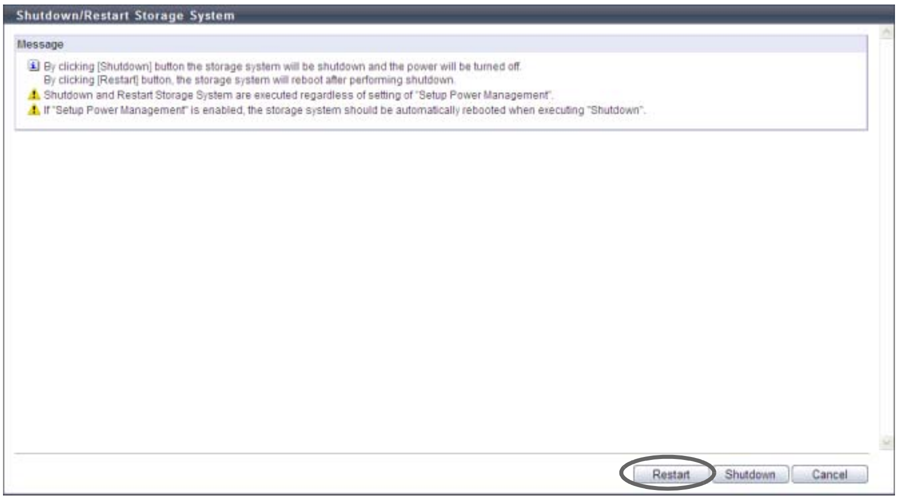
Restart the ETERNUS DX Disk storage system

The procedure to restart the ETERNUS DX Disk storage system is as follows:

Procedure

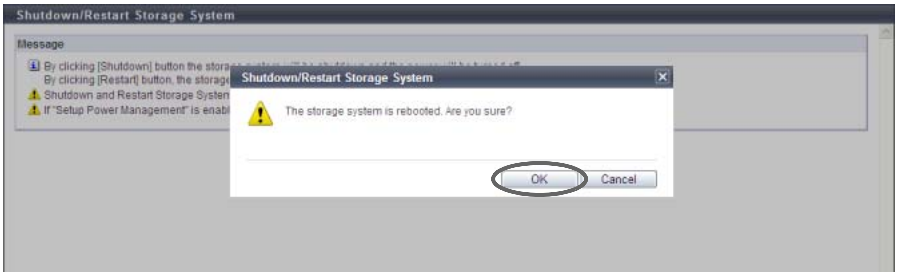
1 Click [Shutdown/Restart] in [Action].

2 Click the [Restart] button.



→ A confirmation screen appears.

3 Click the [OK] button.



→ The ETERNUS DX disk storage system shuts down after 30 seconds. After shutdown, the ETERNUS DX disk storage system restarts.

End of procedure

11.2.12.2 Backup Configuration

This function backs up the configuration definition data to the Bootup and Utility Device (BUD) in the CM. Up to four generations of configuration definition data can be stored.

Caution

This function cannot be used under the following conditions:

- When no configuration definition data file is selected
- When no data exists in the configuration definition data file
- When an error exists with the configuration definition data file size
- When an error exists in the configuration definition data file

The procedure to backup configuration definition file is as follows:

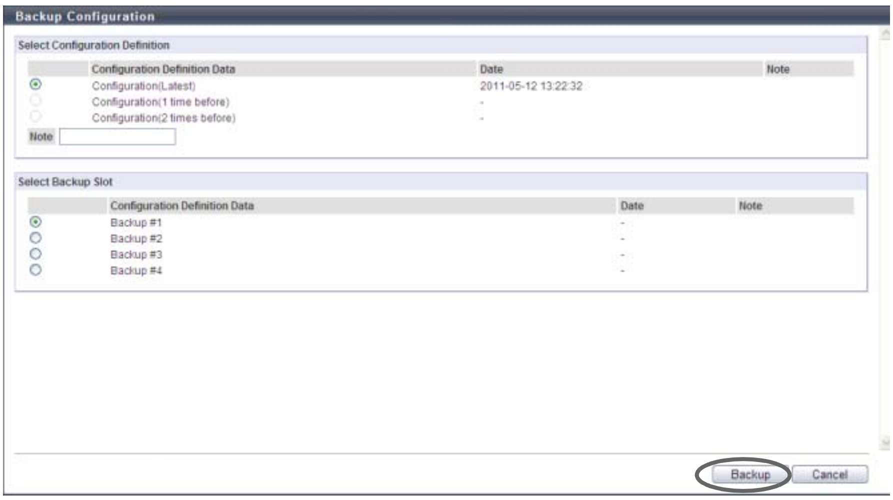
Procedure

1 Click [Backup Configuration] in [Action].

2 Specify the parameters, and click the [Backup] button.

- Select Configuration Definition
  - Configuration Definition Data
    Select configuration definition data to be backed up from "Configuration (Latest)", "Configuration (1 time before)", or "Configuration (2 times before)".
    If "Configuration (1 time before)", or "Configuration (2 times before)" do not exist, the radio button for the corresponding configuration definition data cannot be specified.
  - Note (text box)
    In the "Note" field, remarks which have been added to the selected configuration definition data to be backed up are displayed. If no remarks exist, this field is blank. The "Note" field can be edited (entered).
    The following input condition applies:
    - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")

- Select Backup Slot
  - Configuration Definition Data
    Select backup destination of the configuration definition data from "Backup #1", "Backup #2", "Backup #3", or "Backup #4".
    If a backup destination, on which configuration definition data has already been stored, is selected, the old configuration definition data will be overwritten.



→ A confirmation screen appears.

3 Click the [OK] button.



→ The configuration definition data is backed up.

4 Click the [Done] button to return to the [Utility] screen.

End of procedure

11.2.12.3 Export Configuration

This function exports the configuration file from the ETERNUS DX Disk storage system as a configuration information file and stores it in the local PC, or other medium.

Caution

- The obtained configuration information files may be required to restore the ETERNUS DX Disk storage system if an error occurs. When altering the ETERNUS DX Disk storage system configuration information, it is recommended to backup the configuration information file before making any changes.
- When exporting of the configuration information has been completed, save the file immediately. The extension of the file to be saved must be ". cfg".
- Applying configuration information must be performed by a maintenance engineer with a user account that has the "Maintenance Operation" policy.

The procedure to export configuration definition file is as follows:

Procedure

1 Click [Export Configuration] in [Action].

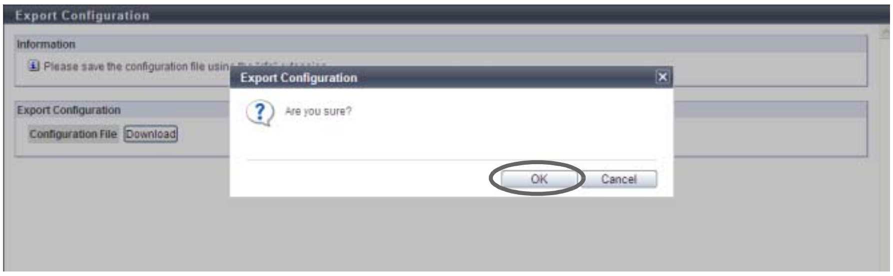
2 Click the [Download] button to save the setup information.



→ A confirmation screen appears.

3 Click the [OK] button.

The extension of the file to be saved must be ".cfg".
The default file name is "Conf_serial number for the ETERNUS DX Disk storage system_YYYY-MM-DD_hh-mm-ss.cfg".
(YYYY-MM-DD_hh-mm-ss: the date and time when the download screen (Step 2) is displayed.)



→ The configuration information is exported.

4 Click the [Cancel] button to return to the [Utility] screen.

Caution

When exporting of the configuration information has been completed, save the log immediately.

End of procedure

11.2.12.4 Start/Stop Performance Monitoring

This function acquires performance information and displays the result.
The Start/Stop Performance Monitoring function is used to start or stop acquiring the ETERNUS DX Disk storage system performance information. Acquired information can be checked using the [Performance] function.

Caution

- When the ETERNUS DX Disk storage system is rebooted, the performance monitoring process is stopped.
- If performance monitoring is started from other monitoring software, GUI cannot stop the process.
- If performance monitoring is started from GUI, the process can be stopped from other monitoring software.

Note

If performance monitoring is started from CLI, GUI can stop the process. If performance monitoring is started from GUI, CLI can stop the process.

The procedure to start or stop performance monitoring is as follows:

Starting performance monitoring

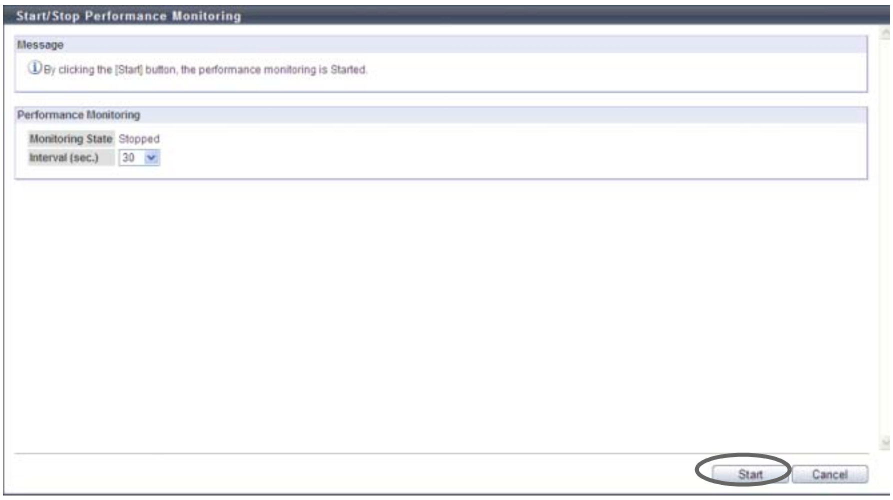
The [Start] button is displayed when the "Monitoring State" is "Stopped".

Procedure

1 Click [Start/Stop Perfmon] in [Action].

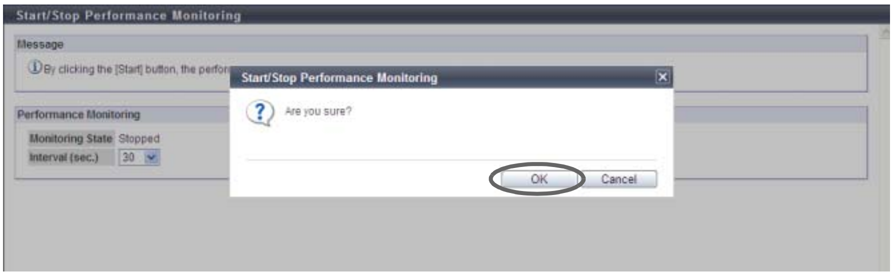
2 Specify the interval, and click the [Start] button.

- Interval (sec.)
  Input the interval to acquire the performance information between 30 and 300 (sec.) in units of 30 seconds.



→ A confirmation screen appears.

3 Click the [OK] button.



→ Acquisition of performance information starts.

4 Click the [Done] button to return to the [Utility] screen.

End of procedure

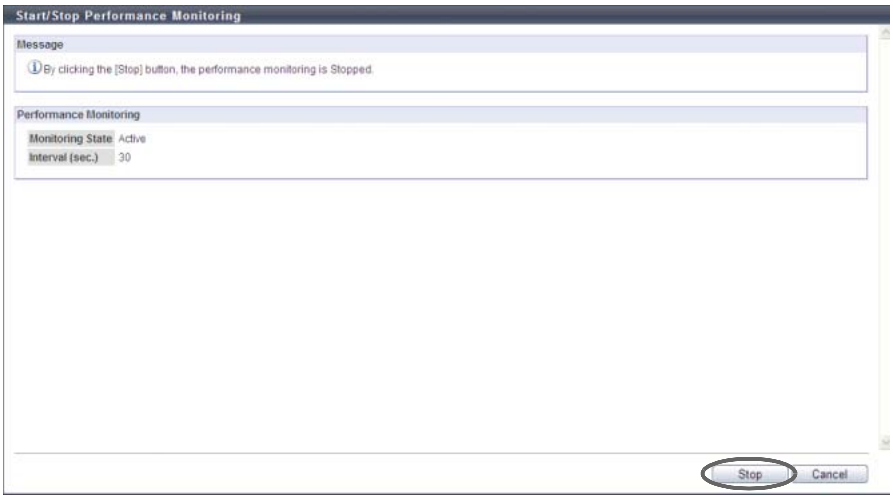
Stopping performance monitoring

The [Stop] button is displayed when "Monitoring State" is "Active".

Procedure

1 Click [Start/Stop Perfmon] in [Action].

2 Click the [Stop] button.

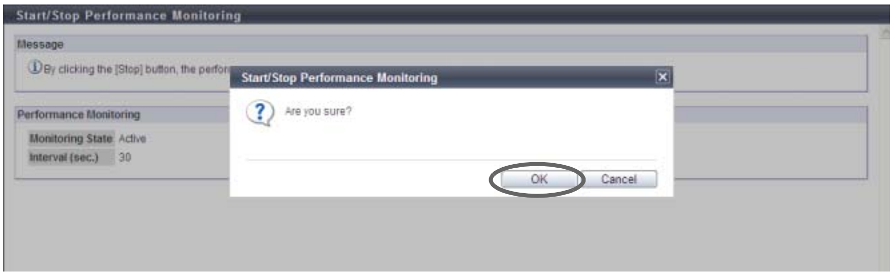


→ A confirmation screen appears.

Caution

If the [Stop] button is clicked after starting performance monitoring from other monitoring software, an error screen is displayed.

3 Click the [OK] button.



→ Acquisition of performance information stops.

4 Click the [Done] button to return to the [Utility] screen.

End of procedure

11.2.13 System Management

This section describes system management.
System management provides the following functions:

- Modify Storage System Name
- Modify Date and Time
- Change Box ID
- Setup Subsystem Parameters
- Setup Encryption Mode
- Setup SMI-S Environment
- Register SED Authentication Key
- Setup Power Management

11.2.13.1 Modify Storage System Name

This function registers the name, administrator, and the installation site of the ETERNUS DX Disk storage system.
Information registered in this screen is used for the following functions and screens:

- Network management using SNMP
- Storage system name displayed in the login screen and the operation screens

Caution

Once the storage system name has been specified, it cannot be deleted (it can be changed).

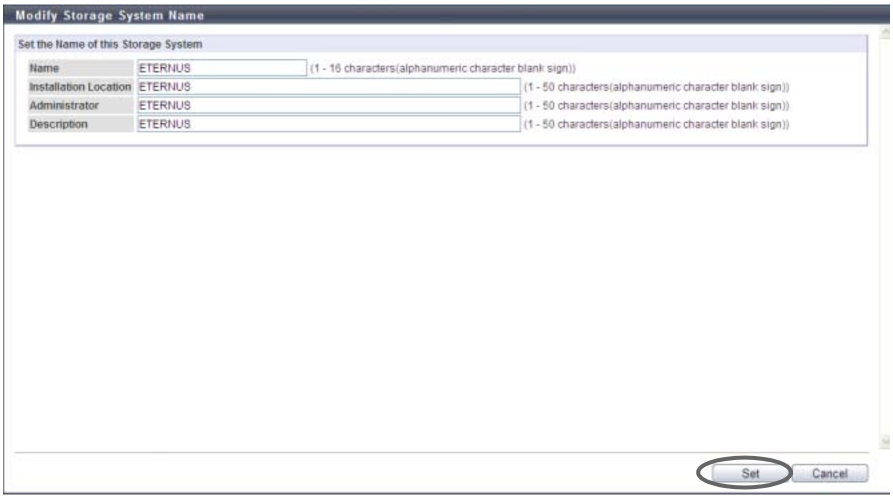
The procedure to change the storage system name is as follows:

Procedure

1 Click [Modify Storage Name] in [Action].

2 Specify the parameters, and click the [Set] button.

- Name
  Specify the storage system name (required).
  The following input conditions apply:
  - Up to 16 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Spaces
- Installation Location
  Specify the installation location of the ETERNUS DX Disk storage system (required).
  The following input conditions apply:
  - Up to 50 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Spaces
- Administrator
  Specify the administrator information (the administrator name, contact information, etc) of the ETERNUS DX Disk storage system (required).
  The following input conditions apply:
  - Up to 50 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Spaces
- Description
  Specify the description of the ETERNUS DX Disk storage system (required).
  The following input conditions apply:
  - Up to 50 alphanumeric characters and symbols (except ", (comma)" and "?")
  - Spaces



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:
- When an unspecified parameter exists
- When a parameter does not satisfy the input conditions

3 Click the [OK] button.



→ Setting of the storage system name starts.

4 Click the [Done] button to return to the [System Settings] screen.

End of procedure

11.2.13.2 Modify Date and Time

This function sets the date/time and time zone (storage system location) of the internal clock in the ETERNUS DX Disk storage system.
The clock is used for checking the internal log of the ETERNUS DX Disk storage system and in the ECO mode, etc. The time zone setting is used for the Remote Support function.
This function is used when moving the ETERNUS DX Disk storage system to a new installation site, and/or changing the system date/time.
It is possible to setup the NTP server to automatically set the time. If the NTP server cannot be used, resetting the time once a month is recommended.

Caution

When using ECO mode, make sure to set the time/date correctly.
If the date/time of the ETERNUS DX Disk storage system is wrong, processes for stopping and starting the disk motor cannot be performed in accordance with the ECO mode schedule.

Note

- When using the NTP server, the time modification method is the step mode (modify immediately).
- When using the NTP server, the ETERNUS DX Disk storage system is synchronized with the NTP server every three hours.

The procedure to set the date and time is as follows:

Procedure

1 Click [Modify Date and Time] in [Action].

2 Specify the parameters, and click the [Set] button.

● Date/Time Information

- Date
  To change the current date and time settings, input the new values.
  - YYYY-MM-DD hh:mm:ss (YYYY: Year (2001 - 2037), MM: Month (01 - 12), DD: Day (01 - 31), hh: Hour (00 - 23), mm: Minute (00 - 59), ss: Second (00 - 59))

● Time Zone

- Time Zone
  Select the Time Zone from the list box. If the appropriate Time Zone does not exist, select "Manually".
- Time Zone (time difference setting)
  When selecting "Manually" in the "Time Zone" field, specify the time difference from GMT using [+]/[-] in hours and minutes.
  - Time difference
    Select "+" or "-".
  - Hour
    00 - 12
  - Minute
    00, 15, 30, 45

● Daylight Saving Time

- Set
  Select whether to set the Daylight Saving Time "ON" or "OFF" with the radio button.
- Range (by day of the week)
  If Daylight Saving Time is enabled, and "by day of the week" is selected for the term, specify the start day, end day, and start time and end time.
  - Start day and end day (Month: January - December, Week: 1st - 4th week and the last week of month, Day: Monday - Sunday)
  - Start time and end time (Hour: 00 - 23)
- Range (by Date)
  If Daylight Saving Time is enabled, and "by Date" is selected for the period, specify the start date, end date, and start time and end time.
  - Start date and end date (Month: January - December, Day: 01 - 31 and the Last Date)
  - Start time and end time (Hour: 00 - 23)

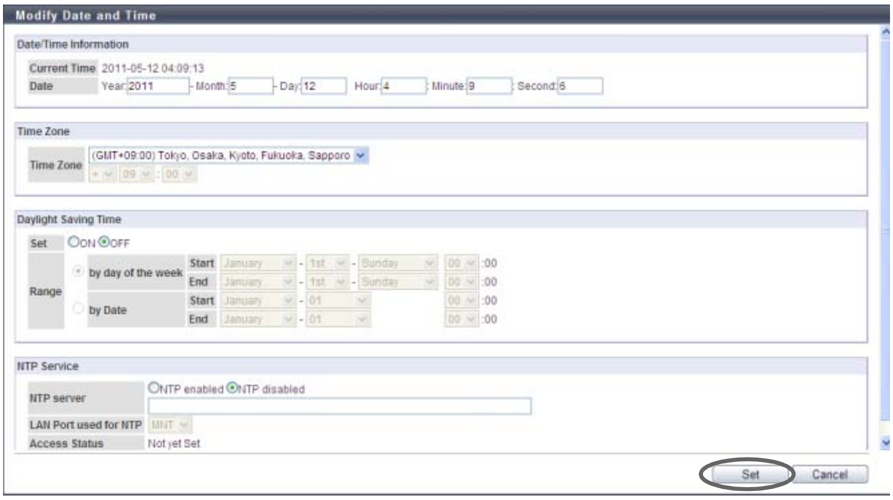
● NTP Service

- NTP server
  Select whether to use the NTP server.
  When NTP is enabled, input the IP address or the server name for the NTP server in the text box.
  There are two methods to specify an IP address; "IPv4" and "IPv6". The following IPv6 addresses can be used; "link local address", "global address", "unique local address", and "6to4 address". Refer to "Available IPv6 Address" (page 757) for details.
  When the current setting is displayed, the IPv6 address is displayed as an abbreviation.

The following input conditions apply:

- For IPv4 address
  - xxx.xxx.xxx.xxx
    xxx: 1 - 255 for the top field (decimal)
    xxx: 0 - 255 for other fields (decimal)
- For IPv6 address
  - xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
    Refer to "IPv6 Address Notation" (page 378) for details.
- For server name specification
  The following input condition applies:
  - Up to 63 alphanumeric characters and symbols

- LAN Port used for NTP
  When the NTP server is enabled, select the port to be used for NTP connection.
  - MNT
  - RMT



→ A confirmation screen appears.

Caution

An error screen appears in the following conditions:

- When a non-existent date has been specified in "New Time"
- When "by day of the week" is selected in Daylight Saving Time, and the same day and time is input for both start day/time and end day/time.
- When "by Date" is selected in Daylight Saving Time, and the same date/time is input for both start date/time and end date/time
- When "by Date" is selected in Daylight Saving Time, and a nonexistent date has been specified as the start date
- When "by Date" is selected in Daylight Saving Time, and a non-existent date has been specified as the end date
- When the "NTP enabled " is selected for "NTP server" and MNT is selected as the "LAN Port used for NTP", the IPv4 address of the NTP server and the broadcast address of the MNT port are the same
- When the "NTP enabled " is selected for "NTP server" and RMT is selected as the "LAN Port used for NTP", the IPv4 address of the NTP server and the broadcast address of the RMT port are the same

- When "NTP enabled " is selected for "NTP server" and one of the following conditions applies to the IP address (IPv4 address or IPv6 address):
  - The IPv4 address for the NTP server and the local host address are the same
  - The IP address (IPv4 address or IPv6 address) for the NTP server and the network address are the same
  - The IP address (IPv4 address or IPv6 address) for the NTP server and the IP address for the MNT port are the same
  - The IP address (IPv4 address or IPv6 address) for the NTP server and the IP address for the RMT port are the same

Note

- Click the [Date/Time Information] tab and the [NTP Service] tab to specify each parameter of date/time information and the NTP service.
- When "by day of the week" is selected in Daylight Saving Time, "Last" can be selected to specify the start or end week.
- When "by Date" is selected in Daylight Saving Time, "Last Date" of the selected month can be selected to specify the start or end date.

3 Click the [OK] button.



→ Date/time information is specified.

Caution

If "NTP enabled" is selected for "NTP server" when there is no NTP server connection or when communication with the NTP server is unstable, the required time for the date and time setting may take longer. Wait until the screen is updated. Even if connection to the NTP server fails, the date and time setting appear as though they have completed. To confirm that the ETERNUS DX Disk storage system is successfully connected to the NTP server, start this function again and check "Access Status" in the "NTP Service" field.

4 Click the [Done] button to return to the [System Settings] screen.

End of procedure

11.2.13.3 Change Box ID

This function changes the Box ID that identifies an ETERNUS DX Disk storage system in the user system.
Box ID is used as information to identify the ETERNUS DX Disk storage system from applications connected to the ETERNUS DX Disk storage system. The initial Box ID is a device ID that is created by combining device information (series name, model, serial number, etc.).
If upgrading or replacing the ETERNUS DX Disk storage system, the existing Box ID will change with the ETERNUS DX Disk storage system change. Therefore, there is a risk that the backup data saved in the previous ETERNUS DX Disk storage system cannot be used, so it is necessary to reconfigure the user system after the ETERNUS DX Disk storage system is upgraded or replaced. This function changes the device BOX ID to the same ID as that of the previous ETERNUS DX Disk storage system in order to avoid any problems and also use the same backup data in the new storage system.

Caution

- A Box ID is a unique name in the user system. Make the Box ID different from that of other ETERNUS DX Disk storage systems in the user system. If the Box ID is not changed, the Device ID is used as a Box ID.
- If the ETERNUS DX Disk storage system Box ID is changed after setting the Advanced Copy path information, Remote Advanced Copy (REC) will no longer run. Create Advanced Copy path information again with the new Box ID, and then specify the new information to all the related ETERNUS DX Disk storage systems.
- The use of spaces that was applied for specifying a Box ID with controller firmware version V10L2x or earlier has changed. When using controller firmware version V10L3x or later, spaces in the Box ID are changed to "#" (hash keys). Note that spaces in the existing Box ID (a Box ID that was set with controller firmware version V10L2x or earlier) is not changed even after controller firmware V10L3x is applied. The existing Box ID can be used. If the Box ID is changed (or the [Set] button is clicked without changing the Box ID) after applying new controller firmware, any spaces in the existing Box ID are changed to "#" (hash keys). When a REC path is already configured in the ETERNUS DX Disk storage system, the Advanced Copy path information must be created and specified again with new Box IDs.
- This function cannot be used when an Advanced Copy session (except ODX and XCOPY) exists in the ETERNUS DX Disk storage system.

The procedure to set the Box ID is as follows:

Procedure

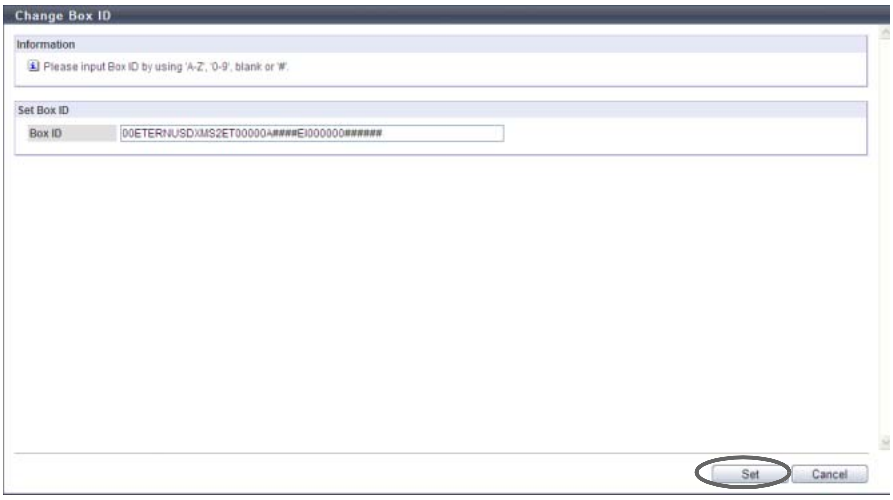
1 Click [Change Box ID] in [Action].

2 The current Box ID setting appears. To change the value, enter a new Box ID and click the [Set] button.

- Box ID
  The Box ID setting of the ETERNUS DX Disk storage system is displayed.
  If the ETERNUS DX Disk storage system is changed, correct the Box ID. The initial Box ID displayed is a 40-digit code (device ID) that is created by combining device information (series name, model, serial number, etc.).
  If the Box ID entered is less than 40 characters, a "#" hash key character is appended to the Box ID for each character short.
  The following input conditions apply:
  - Capital letters
  - Numeric characters
  - Spaces
  - "#" (hash key character)
  - 40 characters (fixed)

  Caution

  When spaces are input for the Box ID, the spaces are changed to "#" (hash keys).



→ A confirmation screen appears.

Caution

If the [Set] button is clicked in the following conditions, an error screen appears:

- When a Box ID is not input
- When the entered value of a Box ID contains a character other than alphabetic characters (upper case), numeric characters, hash key characters (#), or spaces

3 Click the [OK] button.



→ The specified Box ID is registered.

4 Click the [Done] button to return to the [System Settings] screen.

Note

If the Box ID entered is less than 40 characters, a "#" hash key character is appended to the Box ID for each character short. Then, the 40-digit Box ID is registered in the ETERNUS DX Disk storage system.

End of procedure

11.2.13.4 Setup Subsystem Parameters

This function specifies the subsystem parameters.
Subsystem parameters are the information which controls the ETERNUS DX Disk storage system operation when it is connected to hosts. The ETERNUS DX Disk storage system operates according to the specified subsystem parameters, for all the hosts to be connected.

Caution

- Do not change the setting after installing the ETERNUS DX Disk storage system, unless a maintenance engineer instructs otherwise.
- To set the subsystem parameters using this function, set them after stopping all host access.

The procedure to set the subsystem parameters is as follows:

Procedure

1 Click [Setup Subsystem Parameters] in [Action].

2 Specify the parameters, and click the [Set] button.

● Setup Subsystem Parameters

- Load Balance
  Set whether to enable or disable the load balance for the ETERNUS DX Disk storage system.
  When load balance is enabled and the ETERNUS DX Disk storage system is overloaded, the ETERNUS DX Disk storage system responds with the sense that is specified in the "Load Balance Response" field described in "9.2.5.3 Modify Host Response" (page 589).
  If the load balance is disabled, the warning sense response is suppressed and the ETERNUS DX Disk storage system does not respond to any host connecting to the storage system.

  Caution

  - Load balance for all hosts is disabled when "Disable" is selected for "Load Balance". If the ETERNUS DX Disk storage system is in overload in this status, the warning sense response is suppressed.
  - When connecting the ETERNUS DX Disk storage system and HP-UX hosts, disable the Load Balance setting. If "Enable" is selected for "Load Balance", incorrect logs may be recorded in the host.
  - Load balancing by Multipath Driver is operated regardless of whether the "Load Balance" of this function is enabled/disabled.

- Reject INQUIRY from Unauthorized Host
  Select whether to reject the "Inquiry" command from an unauthorized host. Select "Enable" to reject.
  When the "Inquiry" command is rejected, ETERNUS DX Disk storage system returns an Affinity Error (5/25/81) for the "Inquiry" command from the unauthorized host. When the command is not rejected, the ETERNUS DX Disk storage system responds normally.

  Caution

  When using the VERITAS Volume Manager Dynamic Multipathing (VxVM DMP), select "Enable".
  When VxVM DMP is not used, the setting of this parameter does not affect the state of the ETERNUS DX Disk storage system.

- Thin Provisioning Allocation Mode
  Select "TPP balancing" or "TPV balancing" for the allocation mode of Thin Provisioning.
  This mode is applied only for Thin Provisioning pools. Note that this setting is not applied for pools that are created by the Flexible Tier (automatic storage layering) function.
  - TPP balancing
    Physical area is allocated almost evenly from the RAID groups that configure a TPP. Allocation is performed in order of writing to the TPV. This is a conventional method.
  - TPV balancing
    Physical area is allocated almost evenly from the RAID groups that configure a TPP. Allocation is performed by distributing RAID groups evenly for each TPV.

[Example]
Three TPVs (TPV#0, TPV#1, and TPV#2) are registered in a single TPP.
A single TPP is configured with four RAID groups (RAID group #0, RAID group #1, RAID group #2, and RAID group #3).

- TPP balancing
  Physical area is allocated in the following order regardless of the TPV in which the data is written.
  RAID group#0 → RAID group#1 → RAID group#2 → RAID group#3 → RAID group#0 → ...
- TPV balancing
  When data is written in TPVs that are registered in the TPP, the physical area is allocated in the following order.
  TPV#0:
  RAID group#0 → RAID group#1 → RAID group#2 → RAID group#3 → RAID group#0 → ...
  TPV#1:
  RAID group#1 → RAID group#2 → RAID group#3 → RAID group#0 → RAID group#1 → ...
  TPV#2:
  RAID group#2 → RAID group#3 → RAID group#0 → RAID group#1 → RAID group#2 → ...

Caution

The "Thin Provisioning Allocation Mode" is available only when the Thin Provisioning license has been registered.

- Cache Mirroring ⚠

Select whether to enable or disable the cache mirroring.
To change the setting, select the "Change" checkbox, and then select "Enable" or Disable". If the "Change" checkbox is cleared after the setting is changed, the value returns to the previous state when this function is first started.
The cache mirroring function duplicates user data in the cache memory with 2CMs to prevent user data from being lost when the ETERNUS DX Disk storage system fails or while maintenance operations are being performed.

- Enable
  This mode protects user data from being lost when the ETERNUS DX Disk storage system fails or while maintenance operations are being performed.
  By duplicating the user data in the cache memory, the user data is protected even when one of the CM fails.
- Disable
  This mode is used only when a user can recover the data (for example, when High Performance Computing is used).
  This mode gives priority to improving sequential write performance over reliability. In this case, user data is lost when the ETERNUS DX Disk storage system fails or maintenance is performed.

Caution

- It is not necessary to change the default setting ("Enable") for normal use.
- Rebooting the ETERNUS DX Disk storage system is required to enable the new configuration.
  The current cache mirroring setting and the cache mirroring setting after rebooting can be checked. Refer to "11.1.12 System Settings" (page 731) for details.

- The following conditions apply when "Disable" is selected:
  - User data in the cache memory is not duplicated.
  - The parity information for RAID groups for which the type is High Capacity (RAID5), High Reliability (RAID6), or Reliability (RAID5+0) is not duplicated.
  - If a CM is disconnected when the ETERNUS DX Disk storage system fails, the user data in this CM is lost.
  - If a CM is disconnected during one of the following maintenance operations, the user data in this CM is lost.
    - When the maintenance of the CM is performed
    - When maintenance of the components in the CM (memory, BUD, FAN, or CA (*1)) is performed
    - When the preventive maintenance of the CM is performed
    - When preventive maintenance of the components in the CM (memory, BUD, FAN, or CA (*1)) is performed
    - When components in the CM (memory or CA (*1)) are added
    - When a component in the CM (CA) is removed (*1)
    - When force disable is performed for the CM
    - When force disable of components in the DE (IOM or QSFP cable) is performed (*2)

    *1: When using the ETERNUS DX80 S2/DX90 S2

    *2: A CM may become disconnected when the relevant component is disabled depending on the storage system status.

    Note that maintenance, preventive maintenance, adding, removing, or forcibly disabling components can be performed by a maintenance engineer who has the "Maintenance Operation" policy.
  - User data in "Standard (including concatenated volumes using the LUN concatenation function)" and "WSV" type volumes may be lost.
  - The parity information for High Capacity (RAID5), High Reliability (RAID6), or Reliability (RAID5+0) type RAID groups is lost when a CM is disconnected. If this occurs, volumes in the relevant RAID groups lose data consistency and cannot be used any more. Format the volume after maintenance of the CM is complete.
- The following operating conditions are required when "Disable" is selected:
  - A single path configuration must be used. If a multipath configuration is used, sequential write performance is not improved and user data may be lost without realizing it. If operation continues after user data is lost, the ETERNUS DX Disk storage system reads the user data before updating, and any data inconsistency may be detected in the host.
  - Make sure to configure straight access paths between the controlling CM and the RAID group to which the volume belongs. If cross access paths are configured, the expected sequential write performance might not be achieved.
- If the [Apply Configuration] function is performed with "Initialize" or "Restore", the contents of the setting are maintained.
- For an ETERNUS DX80 S2 1CM model, "Disable" can be selected but performance is not improved.
- This item is not displayed for ETERNUS DX8100 S2/DX8700 S2.

- Checkcode Enforcement
  Select whether to enable or disable the Checkcode Enforcement mode.
  - Enable
    Error detection function in the ETERNUS DX Disk storage system is enhanced.
    When data is duplicated, the check codes of all the data blocks are checked.
  - Disable
    Error detection in the ETERNUS DX Disk storage system is performed with the normal procedure.

Caution

If "Enable" is selected, write access performance is reduced.

- I/O Offloading
  Select whether to enable or disable I/O offloading.
  - Enable
    Performs some of the I/O processes in ROE to reduce the CPU usage ratio and improve the maximum performance.
  - Disable
    Performs only the encryption processes and parity creation for RAID5 or RAID6 in ROE, which is the conventional method.

Caution

- When the existing controller firmware is updated to version V10L50 by using the [Apply Controller Firmware] function, "Disable" is selected for this item. For newly purchased ETERNUS DX Disk storage systems, "Enable" is selected for this item. Note that the [Apply Controller Firmware] function can be performed by a maintenance engineer who has the "Maintenance Operation" policy.
- Rebooting the ETERNUS DX Disk storage system is required to enable the new configuration. The current I/O offloading setting and the I/O offloading setting after rebooting can be checked. Refer to "11.1.12 System Settings" (page 731) for details.
- Performance may not be improved even when this item is enabled if the existing ROE busy ratio is high. Refer to "10.1.2.2 Controller Module (Performance)" (page 633) for ROE busy ratio.
- This item is available only for ETERNUS DX8700 S2.

Web GUI Settings

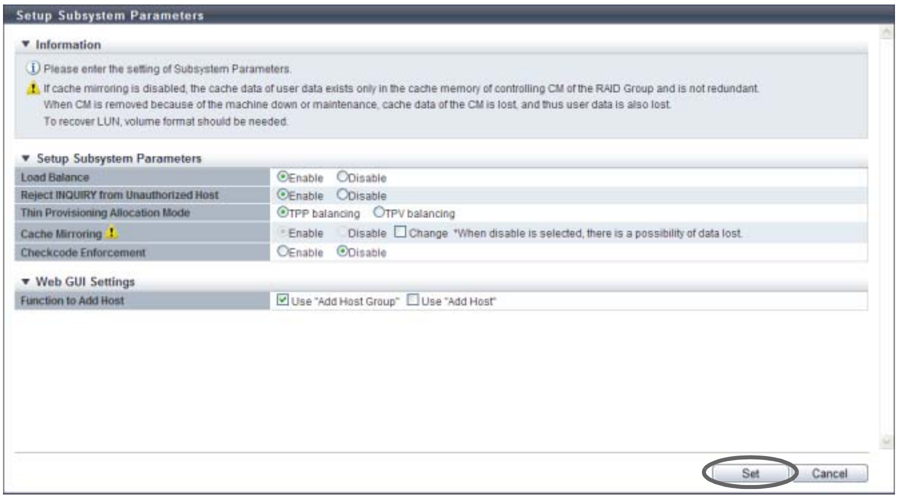
- Function to Add Host
  Select which function for adding hosts is to be used.
  - Use "Add Host Group"
    Create a host group and register the hosts as members. When the "Use "Add Host Group"" checkbox is selected, the actions for creating host groups are displayed.
  - Use "Add Host"
    Register hosts without creating host groups. When the "Use "Add Host"" checkbox is selected, the actions for adding hosts are displayed.

Caution

Selecting either "Use "Add Host Group"" or "Use "Add Host"" is recommended. If both of these checkboxes are not selected, the [Set] button cannot be clicked.

Note

Select "Use "Add Host"" only when using the previous procedure for registering hosts in older storage systems (such as ETERNUS DX410/DX440 and ETERNUS DX8100/DX8400/DX8700). Both checkboxes can be selected at the same time. The "Use "Add Host"" checkbox is cleared by default.

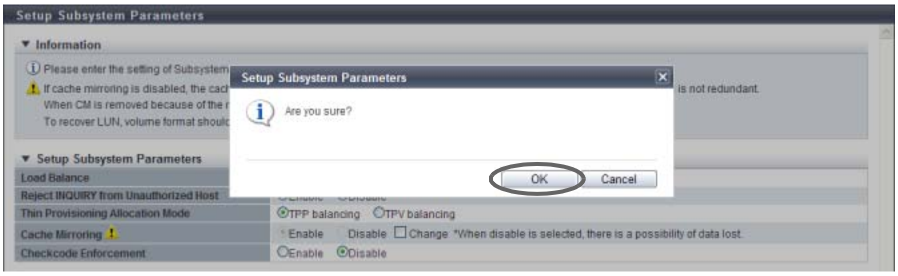


→ A confirmation screen appears.

Caution

- "Cache Mirroring ⚠" is not displayed for ETERNUS DX8100 S2/DX8700 S2.
- "I/O Offloading" is not displayed for ETERNUS DX80 S2/DX90 S2, ETERNUS DX410 S2/DX440 S2, or ETERNUS DX8100 S2.

3 Click the [OK] button.



→ Setting of the subsystem parameter starts.

4 Click the [Done] button to return to the [System Settings] screen.

Caution

- Reboot the ETERNUS DX Disk storage system to enable the cache mirroring setting.
- Reboot the ETERNUS DX Disk storage system to enable the I/O offloading setting.

End of procedure

11.2.13.5 Setup Encryption Mode

This function sets the encryption mode to encrypt volumes by using the CM.

Caution

- Encryption related functions are only available after enabling the encryption mode.
- When disabling the encryption mode, reboot the ETERNUS DX Disk storage system.
- When changing the encryption mode, delete all the encrypted volumes and volumes being encrypted in advance.
- Once a volume has been encrypted, it cannot be changed back to a non-encrypted volume.
- This function cannot be changed in the following conditions:
  - Encrypted volumes exist
  - Volumes being encrypted exist
- If a CM has a cache capacity that is 6GB or less in an ETERNUS DX8700 S2, the encryption mode cannot be enabled ("Fujitsu Original" or "AES" cannot be selected).

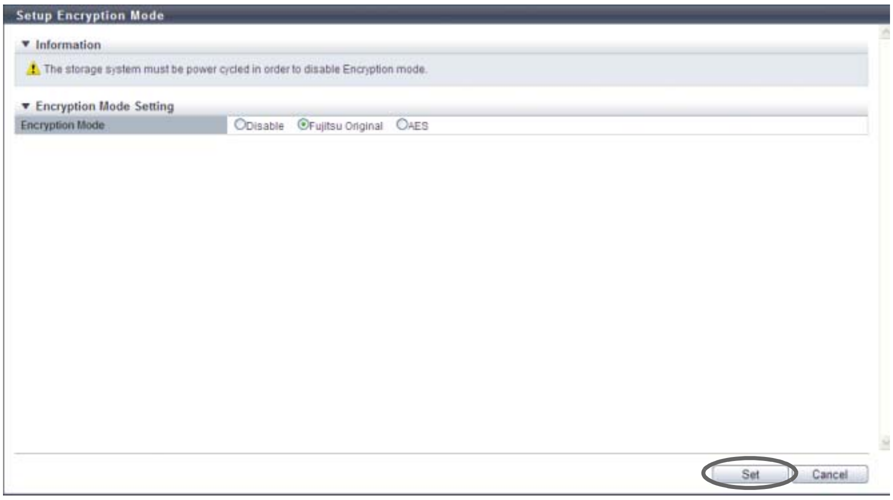
Note

When using the encryption function, set the encryption mode to "Fujitsu Original" or "AES".

The procedure to set the encryption mode is as follows:

Procedure

1. Click [Setup Encryption Mode] in [Action].
2. Select the encryption mode and click the [Set] button.
   - Encryption Mode
     The current encryption mode is displayed.
     When changing the encryption mode, select "Disable", "Fujitsu Original" or "AES".
     - Disable
       "Disable" means no encryption function is used. When changing the encryption mode from "Fujitsu Original" to "Disable" or from "AES" to "Disable", reboot the ETERNUS DX Disk storage system.
     - Fujitsu Original
       "Fujitsu Original" is an encryption method which uses a Fujitsu proprietary algorithm. Compared to AES, its practical security level is almost equal while it allows faster processing than AES.
     - AES
       "Advanced Encryption Standard (AES: Standard encryption used for information processing by the US federal government)" is a standardized encryption method. The ETERNUS DX80 S2/DX90 S2, the ETERNUS DX410 S2/DX440 S2, and the ETERNUS DX8100 S2/DX8700 S2 adopt the AES 128-bit encryption.



→ A confirmation screen appears.

> **Caution**
>
> If the [Set] button is clicked when encrypted volumes or volumes being encrypted exist, an error screen is displayed.

3 Click the [OK] button.



→ The encryption mode setting is performed.

4 Click the [Done] button to return to the [System Settings] screen.

> **Caution**
>
> When disabling the encryption mode, reboot the ETERNUS DX Disk storage system.

End of procedure

11.2.13.6 Setup SMI-S Environment

This function enables or disables the Storage Management Initiative - Specification (SMI-S).
SMI-S is a standard specification concerning storage management technologies by Storage Networking Industry Association (SNIA).

When enabling the SMI-S, the ETERNUS DX Disk storage system can be managed from general storage management applications that support the SMI-S.

Caution

Reboot the ETERNUS DX Disk storage system to apply the new setting.

Note

This function can be used to check the current SMI-S setting and the SMI-S setting after rebooting. Refer to "11.1.12 System Settings" (page 731) for details.

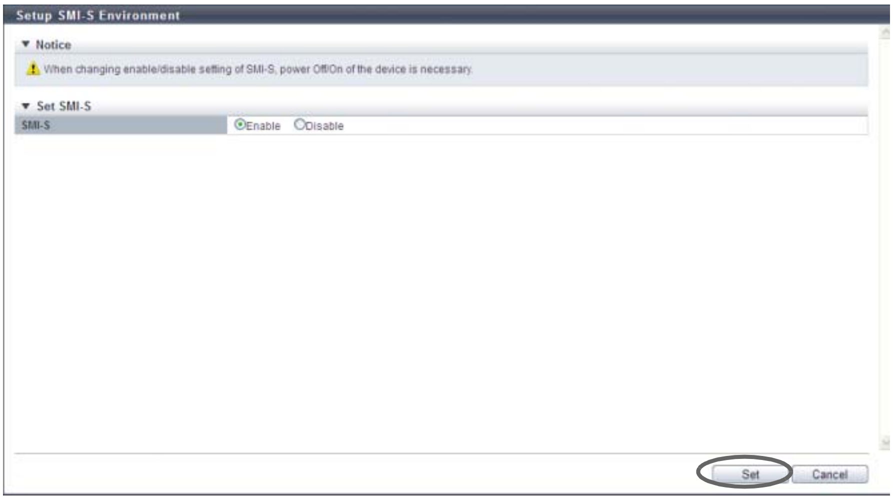
The procedure to enable or disable the SMI-S function is as follows:

Procedure

1 Click [Setup SMI-S Environment] in [Action].

2 Select the parameters, and click the [Set] button.

- SMI-S
  Select whether to "Enable" or "Disable" the SMI-S function.



→ A confirmation screen appears.

3 Click the [OK] button.



→ The SMI-S setting is performed.

4 Click the [Done] button to return to the [System Settings] screen.

> **Caution**
>
> After switching the SMI-S setting between enabled or disabled, reboot the ETERNUS DX Disk storage system.

End of procedure

11.2.13.7 Register SED Authentication Key

This function registers the SED authentication key (common key) that is managed in the ETERNUS DX Disk storage system.
SEDs are used to prevent the leakage of the stored data when physically removed disks are stolen or lost.

> **Caution**
>
> - Register the SED authentication key before installing SEDs in the ETERNUS DX Disk storage system. If a SED is installed without registering the SED authentication key, data leakage in a SED that is removed may occur.
> - If a SED is installed before registering the SED authentication key, register the SED authentication key and reboot the ETERNUS DX Disk storage system.
> - The SED authentication key can only be set once in the ETERNUS DX Disk storage system. The SED authentication key cannot be changed or deleted after being set.
> - Registering a common key is also required when the SED authentication key that is managed in the key server is used.

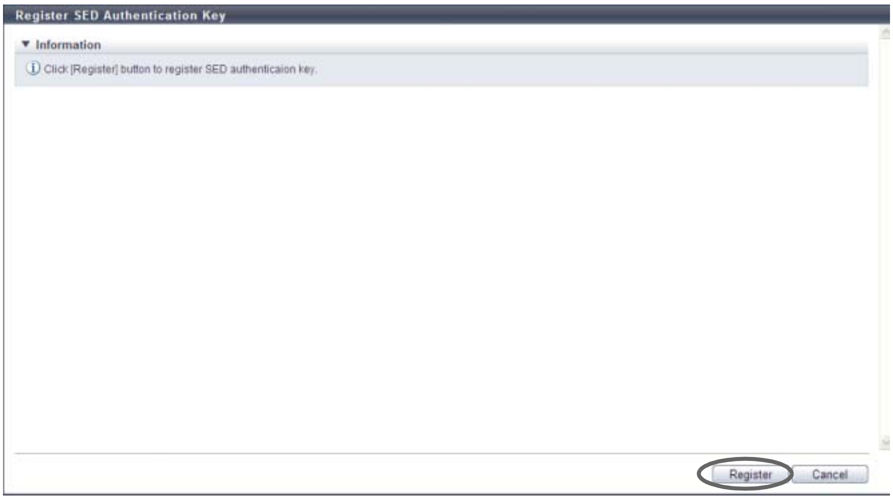
> **Note**
>
> After this function is executed, the SED authentication key is automatically generated and registered in the SED.

The procedure to register SED authentication key is as follows:

Procedure

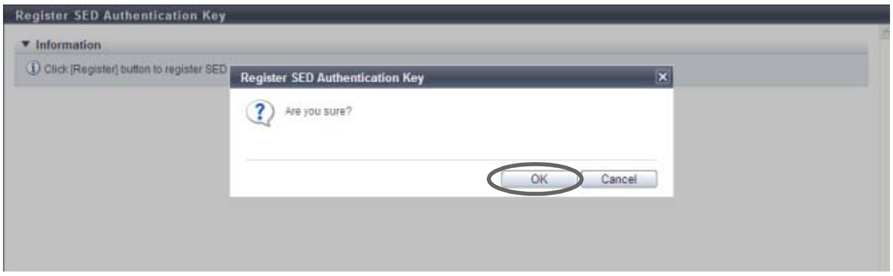
1 Click [Register SED Key] in [Action].

2 Click the [Register] button.



→ A confirmation screen appears.

3 Click the [OK] button.



→ The SED authentication key registration starts.

4 Click the [Done] button to return to the [System Settings] screen.

End of procedure

11.2.13.8 Setup Power Management

This function connects the external input device and controls (shuts down) the ETERNUS DX Disk storage system power.

Caution

If this function is enabled by mistake, the ETERNUS DX Disk storage system may shut down unexpectedly. Make sure to check setting contents before performing settings.

The procedure to perform power management setting is as follows:

Procedure

1 Click [Setup Power Management] in [Action].

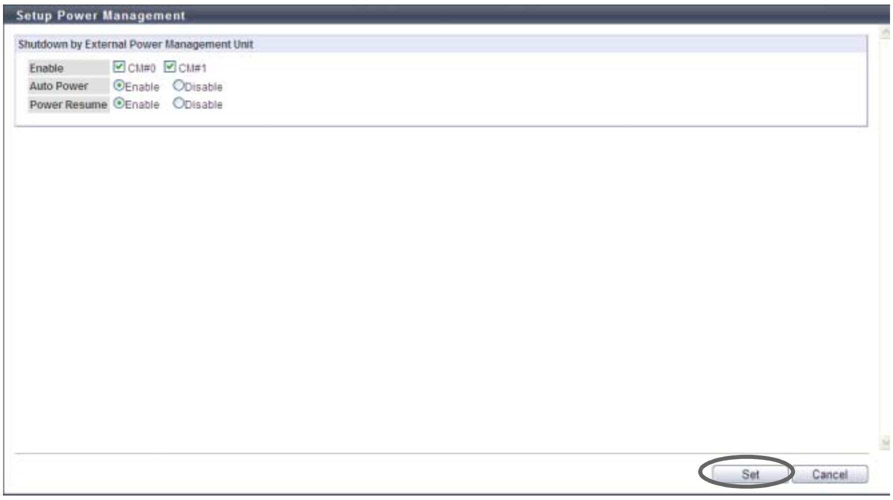
2 Specify the parameters, and click the [Set] button.

- Enable
  Select the checkbox for the Controller Module to enable power management by an external input device (multiple selections can be made).
- Auto Power
  Select whether to "Enable" or "Disable" the AC power interlock mode (the function to automatically power on when AC power is supplied).
  When PMAN is connected, enable the "Auto Power".
  When the power synchronized unit is connected, disable the "Auto Power".
- Power Resume
  Select whether to "Enable" or "Disable" the auto power recovery mode (the function to automatically power on at power recovery after a power failure).

Note

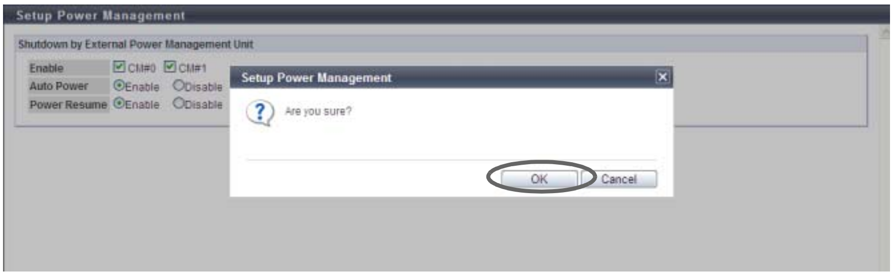
The following items are only required for the ETERNUS DX80 S2/DX90 S2.

- Delay until Shutdown (min.)
  Specify the delay time (minutes) before starting shutdown after receiving a shut down notification signal from the external input device between 0 - 15.
  When PMAN is connected, specify the delay time before starting shutdown after receiving a low battery signal. Specify a delay time longer than the time required for the server shutdown process so that the ETERNUS DX Disk storage system is turned off after the server shutdown is complete.
- Set management unit interface
  Select the external input device connected via RS232C interface from "Power Synchronized Unit", "PMAN", or "Manual".
  The "Manual" setting is for particular use, thus should not be used during normal operation.
- Power Failure Signal
  Select the signal logic for power failure signal when the power failure occurs from "Positive" or "Negative" (Positive: positive logic, Negative: negative logic).
  When "Power Synchronized Unit" or "PMAN" is selected for the "Set management unit interface" field, this item is automatically set.
- Low Battery Signal
  Select the signal logic for a low battery signal when a low battery charge occurs from "Positive" or "Negative" (Positive: positive logic, Negative: negative logic).
  When "Power Synchronized Unit" or "PMAN" is selected for the "Set management unit interface" field, this item is automatically set.
- UPS Shutdown Signal
  When enabling the UPS shutdown signal, select the "Enable" checkbox. Also, select the signal logic for UPS shutdown signal from "Positive" or "Negative" (Positive: positive logic, Negative: negative logic). Select "Disable". (Be sure not to select the "Enable" checkbox.)



→ A confirmation screen appears.

3 Click the [OK] button.



→ Setting of the power management starts.

4 Click the [Done] button to return to the [System Settings] screen.

End of procedure

Appendix A
User Roles and Policies

This chapter describes user roles and policies.

A.1 Roles

When creating a user account, at least one role must be applied.
There are two types of roles: a default role and a custom role. The default role is already prepared in the ETERNUS DX Disk storage system and the custom role can be managed by the user.

Default Role

Use the default roles for normal operation. Default roles cannot be deleted. The default role settings cannot be changed.
The following table shows the default roles and policies that are applied to each default role.

Policies	Default Roles						
	Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer	Software (*1)
Status Display	OK	OK	OK	NG	OK	OK	NG
RAID Group Management	NG	OK	OK	NG	NG	OK	NG
Volume - Create / Modify	NG	OK	OK	NG	NG	OK	NG
Volume - Delete / Format	NG	OK	OK	NG	NG	OK	NG
Host Interface Management	NG	OK	OK	NG	NG	OK	NG
Advanced Copy Management	NG	OK	OK	NG	NG	OK	NG
Copy Session Management	NG	OK	OK	NG	NG	OK	NG
Storage Migration Management	NG	OK	OK	NG	NG	OK	NG
Storage Management	NG	OK	NG	NG	NG	OK	NG
User Management	NG	OK	NG	OK	NG	NG	NG
Authentication / Role	NG	OK	NG	OK	NG	NG	NG
Security Setting	NG	OK	NG	NG	OK	NG	NG
Maintenance Information	NG	OK	NG	NG	OK	OK	NG
Maintenance Operation	NG	NG	NG	NG	NG	OK	NG

OK: Available
NG: Not available

*1: "Software" is the role that is used for external software. A user account with the "Software" role cannot log in to GUI.

Custom Roles

Create custom roles when the operating environment cannot be configured by default roles.
Custom roles have unique names that do not match the existing roles. Policies are applied for custom roles. Multiple policies can be applied to one custom role.
Refer to the following sections for the procedure on how to set custom roles.

- Add Role
  This function creates custom roles.
- Delete Role
  This function deletes custom roles.
- Modify Role
  This function changes custom role settings.

A.2 Availability of Functions for each Policy

Functions that can be used vary depending on the policy.
The following tables show the availability of functions for each policy.
"Software" is the default role that is used for external software. A user account with the "Software" role cannot log in to GUI. "Software" is omitted in the following tables.

Overview (Display)

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Overview	Any policy	OK	OK	OK	OK	OK	OK

Start Initial Setup (Action)

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Start Initial Setup (*1)	Any of the following policies: • Storage Management • Security Setting • Storage Migration Management	NG	OK	OK	NG	OK	OK

*1: The setting items varies depending on the login user role.

Volume Management (Display)

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Volume (Basic Information)	Any of the following policy: • Status Display • Volume - Create / Modify • Volume - Delete / Format • Host Interface Management • Maintenance Operation	OK	OK	OK	NG	OK	OK
Performance (Host I/O)	Volume - Create / Modify	NG	OK	OK	NG	NG	OK

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Performance (Advanced Copy)	Status Display	OK	OK	OK	NG	OK	OK
LUN Group	Any of the following policy: • Status Display • Host Interface Management	OK	OK	OK	NG	OK	OK
Reservation		OK	OK	OK	NG	OK	OK
Pinned Data	Any of the following policy: • Status Display • Maintenance Operation	OK	OK	OK	NG	OK	OK
Bad Sector		OK	OK	OK	NG	OK	OK
Balancing Thin Provisioning Volume	Any of the following policy: • Status Display • Volume - Create / Modify	OK	OK	OK	NG	OK	OK

Volume Management (Action)

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Create Volume	Volume - Create / Modify	NG	OK	OK	NG	NG	OK
Delete Volume	Volume - Delete / Format	NG	OK	OK	NG	NG	OK
Rename Volume	Volume - Create / Modify	NG	OK	OK	NG	NG	OK
Format Volume	Volume - Delete / Format	NG	OK	OK	NG	NG	OK
Expand Volume	Volume - Create / Modify	NG	OK	OK	NG	NG	OK
Expand Thin Provisioning Volume		NG	OK	OK	NG	NG	OK
Start RAID Migration (*1)		NG	OK	OK	NG	NG	OK
Stop RAID Migration		NG	OK	OK	NG	NG	OK
Start Zero Reclamation	RAID Group Management	NG	OK	OK	NG	NG	OK
Stop Zero Reclamation		NG	OK	OK	NG	NG	OK

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Delete Snap Data Pool Volume	Volume - Delete / Format	NG	OK	OK	NG	NG	OK
Force Delete Snap Data Pool Volume		NG	OK	OK	NG	NG	OK
Modify Threshold Thin Provisioning Volume	Volume - Create / Modify	NG	OK	OK	NG	NG	OK
Initialize Snap Data Volume	Volume - Delete / Format	NG	OK	OK	NG	NG	OK
Encrypt Volume	Volume - Create / Modify	NG	OK	OK	NG	NG	OK
Forbid Advanced Copy		NG	OK	OK	NG	NG	OK
Permit Advanced Copy		NG	OK	OK	NG	NG	OK
Modify Cache Parameters		NG	OK	OK	NG	NG	OK
Export Cache Parameters		NG	OK	OK	NG	NG	OK
Export Performance Information	Status Display	OK	OK	OK	NG	OK	OK
Release Reservation	Host Interface Management	NG	OK	OK	NG	NG	OK
Start Balancing of Thin Provisioning Volume	Volume - Create / Modify	NG	OK	OK	NG	NG	OK
Stop Balancing of Thin Provisioning Volume		NG	OK	OK	NG	NG	OK

*1: When performing migration from an encrypted volume to a non-encrypted volume, the "Security Setting" policy is also required.

RAID Group Management (Display)

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
RAID Group (Basic Information)	Any of the following policy: • Status Display • RAID Group Management • Volume - Create / Modify • Maintenance Operation	OK	OK	OK	NG	OK	OK
Tuning	Any of the following policy: • Status Display • RAID Group Management	OK	OK	OK	NG	OK	OK
ECO Mode Schedule (RAID Group)		OK	OK	OK	NG	OK	OK
SED Key Group		OK	OK	OK	NG	OK	OK

RAID Group Management (Action)

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Create RAID Group	RAID Group Management	NG	OK	OK	NG	NG	OK
Delete RAID Group		NG	OK	OK	NG	NG	OK
Rename RAID Group		NG	OK	OK	NG	NG	OK
Change Controlling CM		NG	OK	OK	NG	NG	OK
Expand RAID Group		NG	OK	OK	NG	NG	OK
Modify RAID Group Parameters		NG	OK	OK	NG	NG	OK
Assign ECO Mode Schedule (RAID Group)		NG	OK	OK	NG	NG	OK
Set Key Group (RAID Group)	All of the following policies: • RAID Group Management • Security Setting	NG	OK	NG	NG	NG	NG
Recovery SED		NG	OK	NG	NG	NG	NG

Thin Provisioning Management (Display)

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Maintainer
Thin Provisioning Pool (Basic Information)	Any of the following policy: • Status Display • RAID Group Management • Volume - Create / Modify • Volume - Delete / Format	OK	OK	OK	NG	OK	OK
Threshold (Thin Provisioning Pool)	Any of the following policy: • Status Display • RAID Group Management	OK	OK	OK	NG	OK	OK
ECO Mode Schedule (Thin Provisioning Pool)		OK	OK	OK	NG	OK	OK
License (Thin Provisioning)	Any of the following policy: • RAID Group Management • Storage Management	NG	OK	OK	NG	NG	OK
Flexible Tier Pool (Basic Information)	Any of the following policy: • Status Display • RAID Group Management • Volume - Delete / Format	OK	OK	OK	NG	OK	OK

Thin Provisioning Management (Action)

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Create Thin Provisioning Pool	RAID Group Management	NG	OK	OK	NG	NG	OK
Delete Thin Provisioning Pool		NG	OK	OK	NG	NG	OK
Rename Thin Provisioning Pool		NG	OK	OK	NG	NG	OK
Expand Thin Provisioning Pool		NG	OK	OK	NG	NG	OK
Format Thin Provisioning Pool (All Area)		NG	OK	OK	NG	NG	OK
Format Thin Provisioning Pool (Unformatted Area)		NG	OK	OK	NG	NG	OK
Modify Threshold Thin Provisioning Pool		NG	OK	OK	NG	NG	OK
Modify Cache Parameters (Thin Provisioning Pool)		NG	OK	OK	NG	NG	OK
Assign ECO Mode Schedule (Thin Provisioning Pool)		NG	OK	OK	NG	NG	OK
Register Thin Provisioning License	Storage Management	NG	OK	NG	NG	NG	OK
Delete Thin Provisioning License		NG	OK	NG	NG	NG	OK
Start Balancing Flexible Tier Pool	Volume - Create / Modify	NG	OK	OK	NG	NG	OK
Stop Balancing Flexible Tier Pool		NG	OK	OK	NG	NG	OK

Advanced Copy Management (Display)

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Advanced Copy (Basic Information)	Any of the following policy: • Status Display • Advanced Copy Management • Copy Session Management • Storage Management	OK	OK	OK	NG	OK	OK
Advanced Copy (All Local Sessions)	Any of the following policy: • Status Display • Copy Session Management	OK	OK	OK	NG	OK	OK
EC		OK	OK	OK	NG	OK	OK
OPC		OK	OK	OK	NG	OK	OK
QuickOPC		OK	OK	OK	NG	OK	OK
SnapOPC		OK	OK	OK	NG	OK	OK
SnapOPC+		OK	OK	OK	NG	OK	OK
Monitor		OK	OK	OK	NG	OK	OK
Advanced Copy (All Remote Sessions)		OK	OK	OK	NG	OK	OK
REC		OK	OK	OK	NG	OK	OK
Advanced Copy (ODX)		OK	OK	OK	NG	OK	OK
Advanced Copy (XCOPY)		OK	OK	OK	NG	OK	OK
Setting (Advanced Copy)	Any of the following policy: • Status Display • Advanced Copy Management • Copy Session Management • Storage Management (*1)	OK	OK	OK	NG	OK	OK
Snap Data Pool	Any of the following policy: • Status Display • Advanced Copy Management	OK	OK	OK	NG	OK	OK
Copy Path		OK	OK	OK	NG	OK	OK
REC Buffer		OK	OK	OK	NG	OK	OK
REC Disk Buffer		OK	OK	OK	NG	OK	OK

*1: When displaying the setting status for the Advanced Copy license, the "Storage Management" policy is also required.

Advanced Copy Management (Action)

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Start SnapOPC+	Copy Session Management	NG	OK	OK	NG	NG	OK
Stop Copy Session		NG	OK	OK	NG	NG	OK
Register Advanced Copy License	Storage Management	NG	OK	NG	NG	NG	OK
Delete Advanced Copy License		NG	OK	NG	NG	NG	OK
Modify EC/OPC Priority	Advanced Copy Management	NG	OK	OK	NG	NG	OK
Modify Copy Table Size		NG	OK	OK	NG	NG	OK
Modify Copy Parameters		NG	OK	OK	NG	NG	OK
Enable ODX	Any of the following policy: • Volume - Create / Modify • Volume - Delete / Format • Advanced Copy Management	NG	OK	OK	NG	NG	OK
Disable ODX		NG	OK	OK	NG	NG	OK
Create ODX Buffer Volume		NG	OK	OK	NG	NG	OK
Set Copy Path	Advanced Copy Management	NG	OK	OK	NG	NG	OK
Delete All Copy Path		NG	OK	OK	NG	NG	OK
Export All Copy Path		NG	OK	OK	NG	NG	OK
Export Storage Information		NG	OK	OK	NG	NG	OK
Convert Copy Path		NG	OK	OK	NG	NG	OK
Measure Round Trip Time		NG	OK	OK	NG	NG	OK
Modify REC Multiplicity		NG	OK	OK	NG	NG	OK
Modify REC Buffer		NG	OK	OK	NG	NG	OK
Assign REC Disk Buffer		NG	OK	OK	NG	NG	OK
Create REC Disk Buffer		NG	OK	OK	NG	NG	OK
Delete REC Disk Buffer		NG	OK	OK	NG	NG	OK
Format REC Disk Buffer		NG	OK	OK	NG	NG	OK

Connectivity Management (Display)

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Connectivity (Basic Information)	Any of the following policy: • Status Display • Host Interface Management	OK	OK	OK	NG	OK	OK
Host Group		OK	OK	OK	NG	OK	OK
FC Host		OK	OK	OK	NG	OK	OK
iSCSI Host		OK	OK	OK	NG	OK	OK
SAS Host		OK	OK	OK	NG	OK	OK
Port Group		OK	OK	OK	NG	OK	OK
FC Port		OK	OK	OK	NG	OK	OK
iSCSI Port		OK	OK	OK	NG	OK	OK
SAS Port		OK	OK	OK	NG	OK	OK
FCoE Port		OK	OK	OK	NG	OK	OK
LUN Group		OK	OK	OK	NG	OK	OK
Host Response		OK	OK	OK	NG	OK	OK
CA Reset Group		OK	OK	OK	NG	OK	OK
Host-LU QoS	Host Interface Management	NG	OK	OK	NG	NG	Ok
Host QoS (Basic)		NG	OK	OK	NG	NG	Ok
FC/FCoE Host QoS		NG	OK	OK	NG	NG	Ok
iSCSI Host QoS		NG	OK	OK	NG	NG	Ok
SAS Host QoS		NG	OK	OK	NG	NG	Ok
Port QoS (Basic)		NG	OK	OK	NG	NG	Ok
FC Port QoS		NG	OK	OK	NG	NG	Ok
iSCSI Port QoS		NG	OK	OK	NG	NG	Ok
SAS Port QoS		NG	OK	OK	NG	NG	Ok
FCoE Port QoS		NG	OK	OK	NG	NG	Ok
LU QoS Group		NG	OK	OK	NG	NG	Ok

Connectivity Management (Action)

Host Affinity Management

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Create Host Affinity	Host Interface Management	NG	OK	OK	NG	NG	OK
Delete Host Affinity		NG	OK	OK	NG	NG	OK
Modify Host Affinity		NG	OK	OK	NG	NG	OK

Host Group Management

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Add FC/FCoE Host Group	Host Interface Management	NG	OK	OK	NG	NG	OK
Add iSCSI Host Group		NG	OK	OK	NG	NG	OK
Add SAS Host Group		NG	OK	OK	NG	NG	OK
Delete Host Group		NG	OK	OK	NG	NG	OK
Modify Host Group		NG	OK	OK	NG	NG	OK
Add FC/FCoE Host		NG	OK	OK	NG	NG	OK
Add iSCSI Host		NG	OK	OK	NG	NG	OK
Add SAS Host		NG	OK	OK	NG	NG	OK
Delete FC/FCoE Host		NG	OK	OK	NG	NG	OK
Delete iSCSI Host		NG	OK	OK	NG	NG	OK
Delete SAS Host		NG	OK	OK	NG	NG	OK
Modify FC/FCoE Host		NG	OK	OK	NG	NG	OK
Modify iSCSI Host		NG	OK	OK	NG	NG	OK
Modify SAS Host		NG	OK	OK	NG	NG	OK

CA Port Group Management

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Create FC Port Group	Host Interface Management	NG	OK	OK	NG	NG	OK
Create iSCSI Port Group		NG	OK	OK	NG	NG	OK
Create SAS Port Group		NG	OK	OK	NG	NG	OK
Create FCoE Port Group		NG	OK	OK	NG	NG	OK
Delete CA Port Group		NG	OK	OK	NG	NG	OK
Modify CA Port Group		NG	OK	OK	NG	NG	OK
Modify FC Port Parameters		NG	OK	OK	NG	NG	OK
Modify iSCSI Port Parameters		NG	OK	OK	NG	NG	OK
Modify SAS Port Parameters		NG	OK	OK	NG	NG	OK
Modify FCoE Port Parameters		NG	OK	OK	NG	NG	OK
Modify Port Mode		NG	OK	OK	NG	NG	OK

LUN Group Management

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Add LUN Group	Host Interface Management	NG	OK	OK	NG	NG	OK
Delete LUN Group		NG	OK	OK	NG	NG	OK
Modify LUN Group		NG	OK	OK	NG	NG	OK

Host Response Management

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Add Host Response	Host Interface Management	NG	OK	OK	NG	NG	OK
Delete Host Response		NG	OK	OK	NG	NG	OK
Modify Host Response		NG	OK	OK	NG	NG	OK

Modify CA Reset Group

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Modify CA Reset Group	Host Interface Management	NG	OK	OK	NG	NG	OK

Host-LU QoS Management

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Maintainer
Enable/Disable Host-LU QoS	Host Interface Management	NG	OK	OK	NG	NG	OK
Set Host-LU QoS		NG	OK	OK	NG	NG	OK
Release Host-LU QoS		NG	OK	OK	NG	NG	OK
Start Host-LU QoS Performance Monitoring		NG	OK	OK	NG	NG	OK
Stop Host-LU QoS Performance Monitoring		NG	OK	OK	NG	NG	OK
Set FC/FCoE Host QoS		NG	OK	OK	NG	NG	OK
Set iSCSI Host QoS		NG	OK	OK	NG	NG	OK
Set SAS Host QoS		NG	OK	OK	NG	NG	OK
Set FC Port QoS		NG	OK	OK	NG	NG	OK
Set iSCSI Port QoS		NG	OK	OK	NG	NG	OK
Set SAS Port QoS		NG	OK	OK	NG	NG	OK
Set FCoE Port QoS		NG	OK	OK	NG	NG	OK
Add LU QoS Group		NG	OK	OK	NG	NG	OK
Delete LU QoS Group		NG	OK	OK	NG	NG	OK
Modify LU QoS Group		NG	OK	OK	NG	NG	OK

Component Management (Display)

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Maintainer
Storage (Basic Information)	Any of the following policy: • Status Display • Storage Management (*1) • Maintenance Operation	OK	OK	OK	NG	OK	OK

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Controller Enclosure	Any of the following policy: • Status Display • Maintenance Operation	OK	OK	OK	NG	OK	OK
Controller Module		OK	OK	OK	NG	OK	OK
Controller Module (Performance)		OK	OK	OK	NG	OK	OK
All Channel Adapters	Any of the following policy: • Status Display • Storage Management (*1) • Maintenance Operation	OK	OK	OK	NG	OK	OK
Channel Adapter Ports (Performance)	Any of the following policy: • Status Display • Maintenance Operation	OK	OK	OK	NG	OK	OK
Frontend Router (*2)		OK	OK	OK	NG	OK	OK
Backend Router (*2)		OK	OK	OK	NG	OK	OK
Service Controller (*2)		OK	OK	OK	NG	OK	OK
Power Supply Unit (CE)		OK	OK	OK	NG	OK	OK
Battery (*3)		OK	OK	OK	NG	OK	OK
FAN Unit (*2)		OK	OK	OK	NG	OK	OK
Operation Panel (*2)		OK	OK	OK	NG	OK	OK
Drive Enclosure	Any of the following policy: • Status Display • Maintenance Operation	OK	OK	OK	NG	OK	OK
I/O Module		OK	OK	OK	NG	OK	OK
Port Error Statistics	Status Display	OK	OK	OK	NG	OK	OK
Power Supply Unit (DE)	Any of the following policy: • Status Display • Maintenance Operation	OK	OK	OK	NG	OK	OK

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Maintainer
Disks	Any of the following policy: • Status Display • RAID Group Management • Maintenance Information • Maintenance Operation	OK	OK	OK	NG	OK	OK
Disks (Performance)	Any of the following policy: • Status Display • Maintenance Information	OK	OK	OK	NG	OK	OK
Disk Error Statistics	Maintenance Information	NG	OK	NG	NG	OK	OK

*1: This function is available only when using the ETERNUS DX80 S2/DX90 S2.

*2: This function is available only when using the ETERNUS DX8700 S2.

*3: This function is available only when using the ETERNUS DX410 S2/DX440 S2 or the ETERNUS DX8100 S2/DX8700 S2.

Component Management (Action)

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Maintainer
Add Drive Enclosure	Any of the following policy: • Status Display (*1) • Maintenance Operation	NG	OK	NG	NG	NG	OK
Turn on Locator Beacon/Turn off Locator Beacon	Status Display	OK	OK	OK	NG	OK	OK
Add Channel Adapter Port (*1)	Any of the following policy: • Status Display • Maintenance Operation	NG	OK	NG	NG	NG	OK

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Assign Global Hot Spare	RAID Group Management	NG	OK	OK	NG	NG	OK
Release Global Hot Spare		NG	OK	OK	NG	NG	OK
Assign Dedicated Hot Spare		NG	OK	OK	NG	NG	OK
Release Dedicated Hot Spare		NG	OK	OK	NG	NG	OK
Export Performance Information	Status Display	OK	OK	OK	NG	OK	OK
Clear Disk Error Statistics (All Disks)	Maintenance Information	NG	OK	NG	NG	OK	OK
Clear Disk Error Statistics (Selected Disks)		NG	OK	NG	NG	OK	OK

*1: This function is available only when using the ETERNUS DX80 S2/DX90 S2.

System Management (Display)

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
System (Basic Infor-mation)	Any of the following policy: • Status Display • Storage Management • User Management • Authentication / Role • Security Setting • Maintenance Information • Maintenance Operation	OK	OK	OK	OK	OK	OK
Network	Any of the following policy: • Status Display • Storage Management	OK	OK	OK	NG	OK	OK

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Remote Support (REMCS) for Regions other than EMEA	Any of the following policy: • Status Display • Storage Management • Maintenance Operation	OK	OK	OK	NG	OK	OK
Remote Support (AIS Connect) for Regions other than Japan		OK	OK	OK	NG	OK	OK
Root Certificate	Status Display	OK	OK	OK	NG	OK	OK
Key Management		OK	OK	OK	NG	OK	OK
Key Group		OK	OK	OK	NG	OK	OK
Define Role	Any of the following policy: • User Management • Authentication / Role	NG	OK	NG	OK	NG	NG
ECO Mode	Any of the following policy: • Status Display • RAID Group Management • Maintenance Operation	OK	OK	OK	NG	OK	OK
Event/Dump	Any of the following policy: • Status Display • Storage Management • Maintenance Information • Maintenance Operation	OK	OK	OK	NG	OK	OK
Audit Log	Security Setting	NG	OK	NG	NG	OK	NG
Storage Migration	Any of the following policy: • Status Display • Storage Migration Management	OK	OK	OK	NG	OK	OK

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Utility	Any of the following policy: • Storage Management • Maintenance Information • Maintenance Operation	NG	OK	NG	NG	OK	OK
System Settings	Any of the following policy: • Status Display • Advanced Copy Management • Storage Management • Security Setting • Maintenance Operation	OK	OK	OK	NG	OK	OK

System Management (Action)

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Change User Password	Any policy	OK	OK	OK	OK	OK	OK
Set SSH Public Key		OK	OK	OK	OK	OK	OK

Network Management

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Setup Network Environment	Storage Management	NG	OK	NG	NG	NG	OK
Setup Firewall		NG	OK	NG	NG	NG	OK
Setup SNMP Agent Basic Interface		NG	OK	NG	NG	NG	OK
Setup SNMP Manager		NG	OK	NG	NG	NG	OK
Setup SNMP Agent MIB View		NG	OK	NG	NG	NG	OK
Setup SNMP Agent User		NG	OK	NG	NG	NG	OK
Setup SNMP Agent Community		NG	OK	NG	NG	NG	OK

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Setup SNMP Agent Trap	Storage Management	NG	OK	NG	NG	NG	OK
Download MIB File		NG	OK	NG	NG	NG	OK
Send SNMP Trap Test		NG	OK	NG	NG	NG	OK
Display SMTP Log		NG	OK	NG	NG	NG	OK
Setup E-Mail Notification		NG	OK	NG	NG	NG	OK
Setup Syslog		NG	OK	NG	NG	NG	OK
Setup SSH Server Key		NG	OK	NG	NG	NG	OK
Create Self-signed SSL Certificate		NG	OK	NG	NG	NG	OK
Create Key/CSR		NG	OK	NG	NG	NG	OK
Register SSL Certificate		NG	OK	NG	NG	NG	OK

Remote Support (REMCS) for Regions other than EMEA

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Display Communication Log	Storage Management	NG	OK	NG	NG	NG	OK
Setup Remote Support		NG	OK	NG	NG	NG	OK
Update Customer Information		NG	OK	NG	NG	NG	OK
Update Communication Environment Information		NG	OK	NG	NG	NG	OK
Setup Log Sending Parameters		NG	OK	NG	NG	NG	OK
Stop/Restart Remote Support		NG	OK	NG	NG	NG	OK

Remote Support (AIS Connect) for Regions other than Japan

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Setup AIS Connect Environment	Any of the following policy: • Storage Management • Maintenance Operation	NG	OK	NG	NG	NG	OK
Setup Remote Session Permission		NG	OK	NG	NG	NG	OK
Send Log		NG	OK	NG	NG	NG	OK
Test Server Connectivity		NG	OK	NG	NG	NG	OK
Send AIS Connect Test Event		NG	OK	NG	NG	NG	OK
Import Root Certificate	Storage Management	NG	OK	NG	NG	NG	OK

Key Management

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Setup Key Management Machine Name	Security Setting	NG	OK	NG	NG	OK	NG
Add Key Server		NG	OK	NG	NG	OK	NG
Delete Key Server		NG	OK	NG	NG	OK	NG
Modify Key Server		NG	OK	NG	NG	OK	NG
Create Key Group		NG	OK	NG	NG	OK	NG
Delete Key Group		NG	OK	NG	NG	OK	NG
Modify Key Group		NG	OK	NG	NG	OK	NG
Update SED Authentication Key		NG	OK	NG	NG	OK	NG
Import SSL/KMIP Certificate		NG	OK	NG	NG	OK	NG

User Management

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Setup User Account	User Management	NG	OK	NG	OK	NG	NG
Initialize User Account		NG	OK	NG	OK	NG	NG
Modify RADIUS	Authentication / Role	NG	OK	NG	OK	NG	NG
Add Role		NG	OK	NG	OK	NG	NG
Delete Role		NG	OK	NG	OK	NG	NG
Modify Role		NG	OK	NG	OK	NG	NG

ECO Mode Management

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Modify ECO Mode General Setting	Any of the following policy: • Storage Management • Maintenance Operation	NG	OK	OK	NG	NG	OK
Create ECO Mode Schedule	RAID Group Management	NG	OK	OK	NG	NG	OK
Delete ECO Mode Schedule		NG	OK	OK	NG	NG	OK
Modify ECO Mode Schedule		NG	OK	OK	NG	NG	OK

Event/Dump Management

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Setup Event Notification	Storage Management	NG	OK	NG	NG	NG	OK
Display Event Log	Maintenance Information	NG	OK	NG	NG	OK	OK
Export/Delete Log (*1)		NG	OK	NG	NG	OK	OK
Export Panic Dump (*2)		NG	OK	NG	NG	OK	OK

*1: The "Maintenance Operation" policy is also required for deleting logs.

*2: The "Maintenance Operation" policy is also required for deleting panic dumps.

Audit Log

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Enable Audit Log	Security Setting	NG	OK	NG	NG	OK	NG
Disable Audit Log		NG	OK	NG	NG	OK	NG
Setup Audit Log		NG	OK	NG	NG	OK	NG

Storage Migration Management

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Start Storage Migration	Storage Migration Management	NG	OK	OK	NG	NG	OK
Download Template File for Storage Migration Settings		NG	OK	OK	NG	NG	OK
Delete Storage Migration Path		NG	OK	OK	NG	NG	OK
Download Storage Migration Result		NG	OK	OK	NG	NG	OK
Restart Storage Migration		NG	OK	OK	NG	NG	OK
Suspend Storage Migration		NG	OK	OK	NG	NG	OK
Stop Storage Migration		NG	OK	OK	NG	NG	OK

Utility Management

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Shutdown/Restart Storage System	Storage Management	NG	OK	NG	NG	NG	OK
Backup Configuration	Maintenance Information	NG	OK	NG	NG	OK	OK
Export Configuration		NG	OK	NG	NG	OK	OK
Start/Stop Performance Monitoring	Storage Management	NG	OK	NG	NG	NG	OK

System Management

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Modify Storage Name	Storage Management	NG	OK	NG	NG	NG	OK
Modify Date and Time		NG	OK	NG	NG	NG	OK
Change Box ID	Advanced Copy Management	NG	OK	OK	NG	NG	OK
Setup Subsystem Parameters	Any of the following policy: • Storage Management • Maintenance Operation	NG	OK	NG	NG	NG	OK
Setup Encryption Mode	Security Setting	NG	OK	NG	NG	OK	NG
Setup SMI-S Environment	Storage Management	NG	OK	NG	NG	NG	OK
Register SED Authentication Key	Security Setting	NG	OK	NG	NG	OK	NG
Setup Power Management	Storage Management	NG	OK	NG	NG	NG	OK

OK: Available function
NG: Unavailable function

Appendix B
Status List

This chapter describes the meaning of status icon.

B.1 Device General Status

The general status of the ETERNUS DX Disk storage system is displayed as an icon with character strings.
A "Normal (green)" general status icon indicates normal status, while other color images indicate a failure.
The meaning of each general status icon is described below.

Device general status	Description
Normal (Green)	The ETERNUS DX Disk storage system is in normal state.
Maintenance (Orange)	The ETERNUS DX Disk storage system is under maintenance.
Warning (Yellow)	The ETERNUS DX Disk storage system is in warning state.
Error (Red)	The ETERNUS DX Disk storage system is in failed status.
Not Ready (Red)	"Not Ready" is a status where an abnormality is detected at a power-off, and I/O access from the host cannot be received.

B.1.1 Device General Status (Detail)

The detailed information of the ETERNUS DX Disk storage system general status is displayed with an icon and character strings in the [Storage] screen under the [Component] navigation.
The meaning of ETERNUS DX Disk storage system general status (detail) is described below.

Device general status (detail)	Device general status	Description
Normal	Normal (Green)	The ETERNUS DX Disk storage system is in normal state.
Maintenance	Maintenance (Orange)	Components that are undergoing maintenance exist in the ETERNUS DX Disk storage system. Rebuild or copyback is being performed.
Change Controlling CM	Maintenance (Orange)	Changing of the controlling CM is required.
Pinned Data	Warning (Yellow)	Pinned data is detected.
Warning	Warning (Yellow)	A component requires preventive maintenance. A bad sector is detected.
Error	Error (Red)	A component has an error.
Loop Down	Error (Red)	There is a SAS cascade that cannot access all of the DEs due to an error.
Not Ready	Not Ready (Red)	A failure is detected when starting or turning off the ETERNUS DX Disk storage system. I/O from the host cannot be received normally.
Subsystem Down	Not Ready (Red)	The ETERNUS DX Disk storage system is in failed status. I/O from the host cannot be received normally.
Unknown	Error (Red)	A status other than the ones listed above.

B.2 Volume Status

Volume status is displayed with an icon and the status name. The volume status is described below.

Status	Description
Available	The volume is operating normally.
Spare in Use	The RAID group to which the volume belongs manages redundancy by using the hot spare disk.
Readying	The volume is not formatted.
Rebuild	Rebuilding from a failed data disk to the hot spare disk or to the replaced disk is being performed in the RAID group to which the volume belongs.
Copyback	Copyback is being performed from the hot spare disk to the new data disk in the RAID group to which the volume belongs.
Redundant Copy	Redundant copy to the hot spare disk is being performed in the RAID group to which the volume belongs.
Partially Exposed Rebuild	Rebuilding from the first failed data disk to the hot spare disk or to the replaced disk is being performed in the RAID group to which the volume belongs. This status is displayed only when the RAID type of the RAID group to which the volume belongs is "High Reliability (RAID6)".
Exposed Rebuild	Two of the data disks for the RAID group to which the volume belongs have failed. Rebuilding from the first failed data disk to the hot spare disk or to the replaced disk is being performed. In addition, all the hot spare disks have already been used. As a result, the second failed data disk is waiting for the hot spare disk to become available. This status is displayed only when the type of the RAID group to which the volume belongs is "High Reliability (RAID6)".
Exposed	The RAID group to which the volume belongs lost redundancy due to disk failure.
Partially Exposed	One of the disks that configures the RAID group to which the volume belongs has failed. This status is displayed only when the type of the RAID group to which the volume belongs is "High Reliability (RAID6)".
Not Ready	The RAID group to which the volume belongs is blocked.
Broken	The volume is broken.
Data Lost	Data in the volume is lost. Reading or writing of data cannot be performed.
Unknown	A status other than the ones listed above.

B.3 RAID Group Status

RAID group status is displayed with an icon and the status name. The RAID group status is described below.

Status	Description
Available	The RAID group is operating normally.
Spare in Use	Rebuilding to the hot spare disk is complete. The RAID group manages redundancy by using the hot spare disk.
Readying	The RAID group that is registered as an REC Disk Buffer is not formatted. This status is displayed only for a RAID group that is registered as an REC Disk Buffer.
Rebuild	Rebuilding from a failed data disk to the hot spare disk or to the replaced disk is being performed in the RAID group.
Copyback	Copyback from the hot spare disk to the new data disk is being performed in the RAID group.
Redundant Copy	Redundant copy to the hot spare disk is being performed in the RAID group.
Partially Exposed Rebuild	Rebuilding from the first failed data disk to the hot spare disk or to the replaced disk is being performed in the RAID group. This status is displayed only when the RAID type of the RAID group is "High Reliability (RAID6)".
Exposed Rebuild	Two of the data disks for the RAID group have failed. Rebuilding from the first failed data disk to the hot spare disk or to the replaced disk is being performed. In addition, all the hot spare disks have already been used. As a result, the second failed data disk is waiting for the hot spare disk to become available. This status is displayed only when the RAID type of the RAID group is "High Reliability (RAID6)".
Exposed	The RAID group lost redundancy due to disk failure.
Partially Exposed	One of the disks that configures the RAID group has failed. This status is displayed only when the type of the RAID group is "High Reliability (RAID6)".
No Disk Path	The RAID group is blocked.
SED Locked	The RAID group is blocked. If an SED authentication key cannot be obtained from the key server, "SED Locked" is displayed.
Broken	The RAID group is broken.
Unknown	A status other than the ones listed above.

B.4 Thin Provisioning Pool Status

Thin Provisioning Pool (TPP) status is displayed with an icon and the status name. The TPP status is described below.

Status	Description
Available	The TPP is operating normally.
Maintenance	Forcible recovery of the TPP is being performed.
Readying	All the physical area in the TPP is not formatted.
Partially Readying	Some parts of the physical area in the TPP is not formatted.
Exposed	The TPP is available. The "Exposed" status of the TPP is displayed not only when the RAID group that configures the TPP has lost redundancy and is in "Exposed" status, but also when the RAID group maintains redundancy in "Spare in Use" status. The "Exposed" status of TPP indicates that the RAID group in the TPP is not in normal status because of any causes such as the disk failure.
Blockade	The TPP is blocked.
Broken	The TPP is broken.
Data Lost	Data in the TPP is lost. Reading or writing of data cannot be performed.
Unknown	A status other than the ones listed above.

B.5 Component Status

This section explains the component status.
The status of the components is displayed with an icon for each device image in the view screen.

Status	Description
	The component is operating normally.
	The component is installed, but not used.
	The component is under maintenance.
	The component requires preventive maintenance.
	An error has occurred in the component.
	A status other than the ones listed above.

In the list screen and the detailed information screen, the status of the components is displayed with an icon and the status name.

Status	Description
Normal	The component is operating normally.
Unconnected	A faulty component exists in the ETERNUS DX Disk storage system.
Undefined	The component is installed, but not used.
Undefined (Error)	The component, which is not being used, is in error state.
Normal (Unused parts inside)	There is an unused component that is installed in the ETERNUS DX Disk storage system.
Check1	The component is being rebooted.
Maintenance	The component is under maintenance.
Warning	The component requires preventive maintenance.
Error	An error has occurred in the component.
Unknown	A status other than the ones listed above.

B.5.1 Drive Status

Drive status is displayed with an icon and the status name. The drive status is described below.

Status	Description
Available	The drive is in normal status. The drive is used in the RAID group.
Spare	The drive is an unused hot spare.
Present	The drive is not used (not registered as a RAID group or hot spare), or is waiting for rebuild/copy back.
Readying	The drive is starting up.
Rebuild/Copyback	Rebuild or copy back is being performed in the drive.
Redundant Copy	A Redundant copy is being performed in the drive.
Not Supported	The drive is not supported. [Example] Drive capacity is insufficient.
Not Exist	The drive cannot be recognized.
Failed Usable	An error involving RAID group failure has occurred in the drive.
Broken	An error has occurred in the drive.
Unknown	A status other than the ones listed above.

B.6 Key Status

Key status is displayed with the status name. The key status is described below.

Status	Description
Normal	A valid key is registered for the SEDs. The key is in normal state.
Unregistered Server Certificate	The "SSL / KMIP Certificate" (key server certification) is not registered in the ETERNUS DX Disk storage system. Communication between the ETERNUS DX Disk storage system and the key server cannot be performed.
Expired Server Certificate	The "SSL / KMIP Certificate" (key server certification) has expired. Communication between the ETERNUS DX Disk storage system and the key server cannot be performed.
No SSL Certificate	An SSL certificate (*1) for the ETERNUS DX Disk storage system has not been created. Communication between the ETERNUS DX Disk storage system and the key server cannot be performed.
Network Error	The key cannot be obtained due to a network error between the ETERNUS DX Disk storage system and the key server.
Not Acquired	The required key for starting key server management is not obtained. The allocation of the Master server and the Slave server to the key group has been deleted.
Expiration	An expired key is registered in the SED. The key has expired, but a new key can be obtained from the server.
Key Server Error	The network between the ETERNUS DX Disk storage system and the key server is in normal status, but no SED key is stored in the key server.
Modifying	A RAID group in which the key is being modified exists in the key group. "RAID group of which key is modifying" indicates the following conditions: • The key is being updated manually from GUI or CLI • The key is automatically being updated because it expired • Updating of the key stopped due to an error • SEDs are maintained while a network error occurs when the security level is "Low"

*1: "Self-signed SSL certificate" or "SSL server certificate"

B.7 Key Server Status

Key server status is displayed with the status name. The key server status is described below.

Status	Description
Normal	The communication between the ETERNUS DX Disk storage system and the key server is normal. The key can be obtained successfully. The key server is in normal state.
Setting	"Setting" indicates the following conditions: • The "SSL / KMIP Certificate" (key server certification) or SSL certificate (*1) is not registered. • The network between the ETERNUS DX Disk storage system and the key server is normal, but connection to the key server is forbidden.
Network Error	The network between the ETERNUS DX Disk storage system and the key server is not connected normally.
Key Acquisition Failure	The key that is requested from the ETERNUS DX Disk storage system does not exist in the key server.
Key Server Error	An error due to a failure other than key acquisition failure is detected.
Internal Error	Communication to the key server could not be performed due to an internal failure of the ETERNUS DX Disk storage system.

*1: "Self-signed SSL certificate" or "SSL server certificate"

Appendix C
Installing the Security Certificate

This chapter describes how to install the web-site certificate.
This chapter provides an example of when using Internet Explorer and Firefox.

C.1 For Internet Explorer

This section describes the procedure to install security certificate.
The procedure to install security certificate for Internet Explorer 8 is as follows:

Note

Register the URL of the ETERNUS DX Disk storage system in "Trusted Sites" before installing the security certificate.
Use the Internet Option and specify the URL to be used for connecting to the ETERNUS DX Disk storage system (https://IP address of the ETERNUS DX Disk storage system) to the "Trusted Sites".

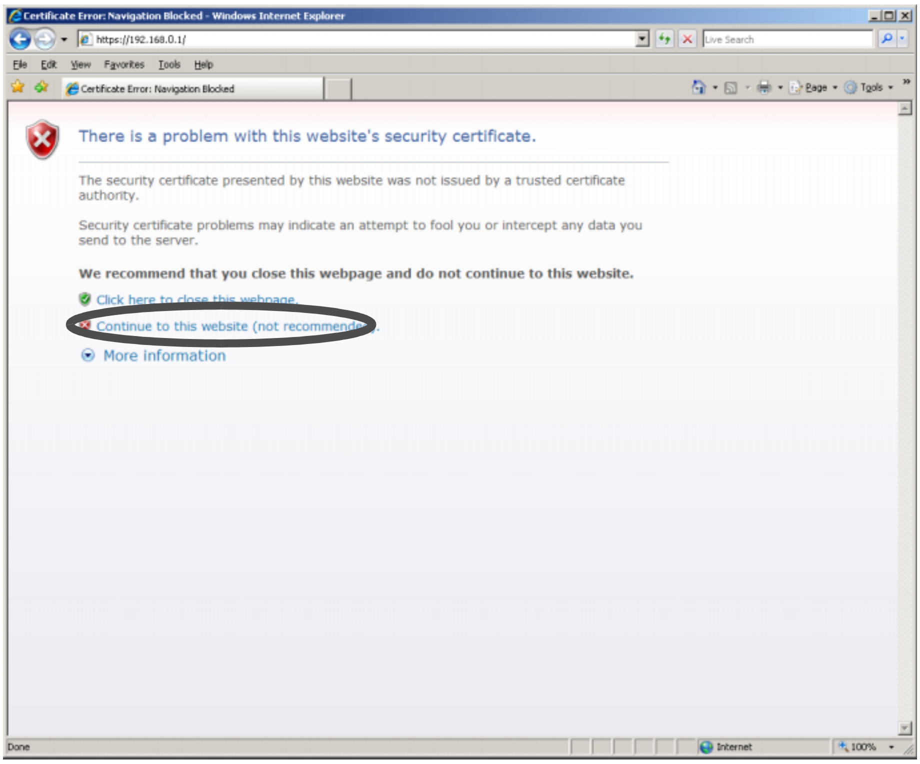
Procedure

1 Enter the URL to the address bar in the web browser.

Specify "https://IP address of the ETERNUS DX Disk storage system" (Default IP address is "192.168.1.1").

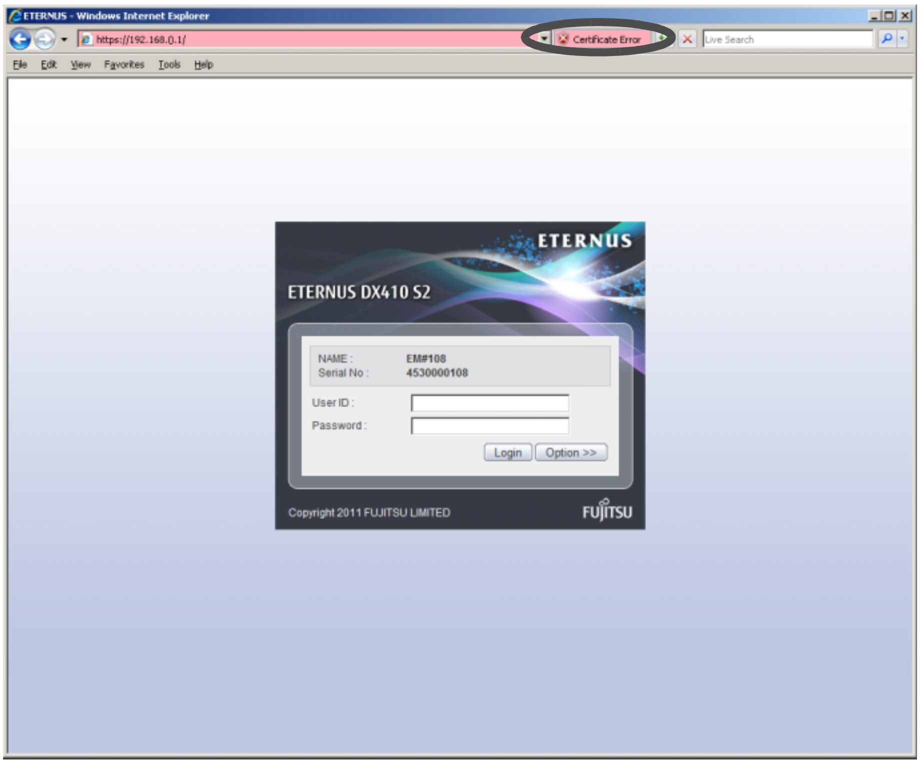
→ A confirmation screen for security certificate appears.

2 Click the [Continue to this website (not recommended)] link.



→ The login screen for GUI is displayed.

3 Click the "Certificate Error".



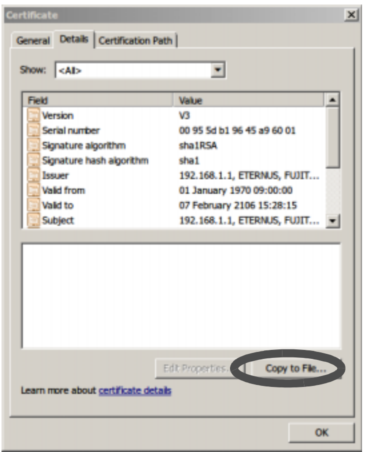
→ A warning message appears.

4 Click the [View certificates] link.



→ The site certificate information appears.

5 Click the [Copy to File...] button on the [Details] tab.

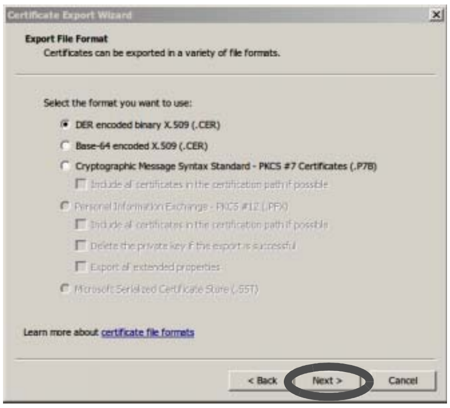


→ The [Certificate Export Wizard] screen appears.

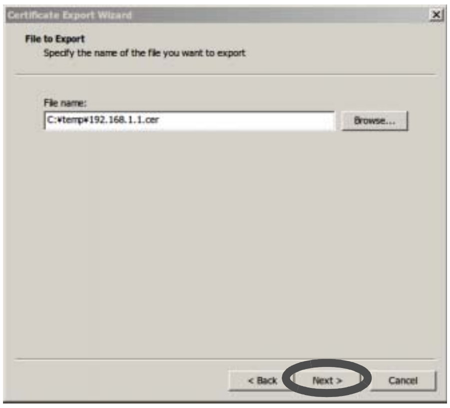
6 Click the [Next >] button.



7 Select "DER encoded binary X.509 (.CER)" and click the [Next >] button.



8 Select the file name that is to be exported, and then click the [Next >] button.

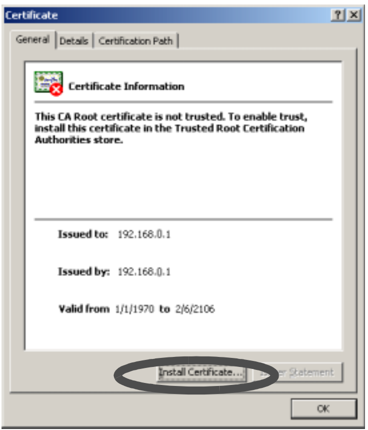


9 Click the [Finish] button.



→ The information of the exported certificate is displayed.

10 Click the [Install Certificate] button on the [General] tab.



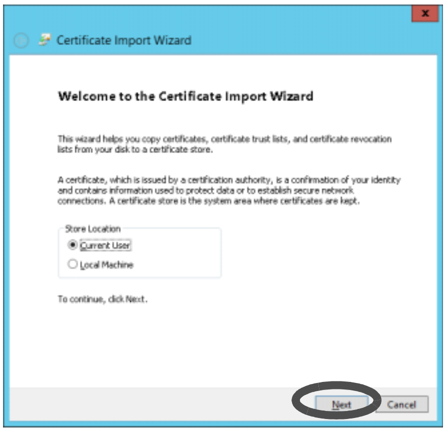
→ The [Certificate Import Wizard] screen appears.

11 Click the [Next >] button.



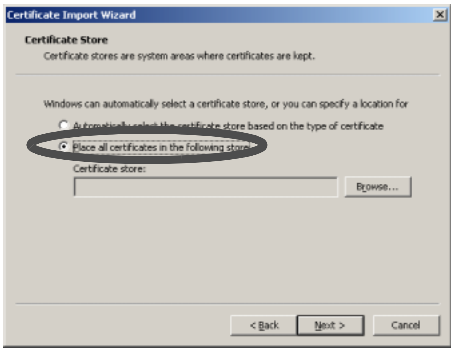
Note

The following screen is displayed when using Internet Explorer 10.0.



Select "Current User" or "Local Machine" on the start screen.
To accept only the currently logged in user with the current PC, select "Current User".
To accept other users that log in with the current PC, select "Local Machine".

12 Select "Place all certificates in the following store".



→ The [Select Certificate Store] screen appears.

Caution

If "Automatically select the certificate store based on the type of certificate" is selected in the "Certificate Import Wizard", an error may occur in the security certificate according to the customer environment.

13 Select the "Trusted Root Certification Authorities", and click the [OK] button.

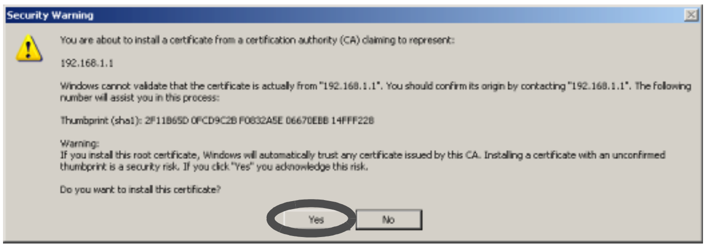


14 Click the [Finish] button.



→ The [Security Warning] dialog box appears.

15 Click the [Yes] button.



Caution

After clicking the [No] button, the operation may not be continuable. If this occurs, restart the web browser.

→ The completion screen appears.

16 Click the [OK] button.



→ The security certificate is installed. Restart the web browser.

End of procedure

C.2 For Firefox

This section provides the procedure to install the security certificate.
The example when installing security certificate for Firefox 3.6. X is as follows:

When installing a new security certificate

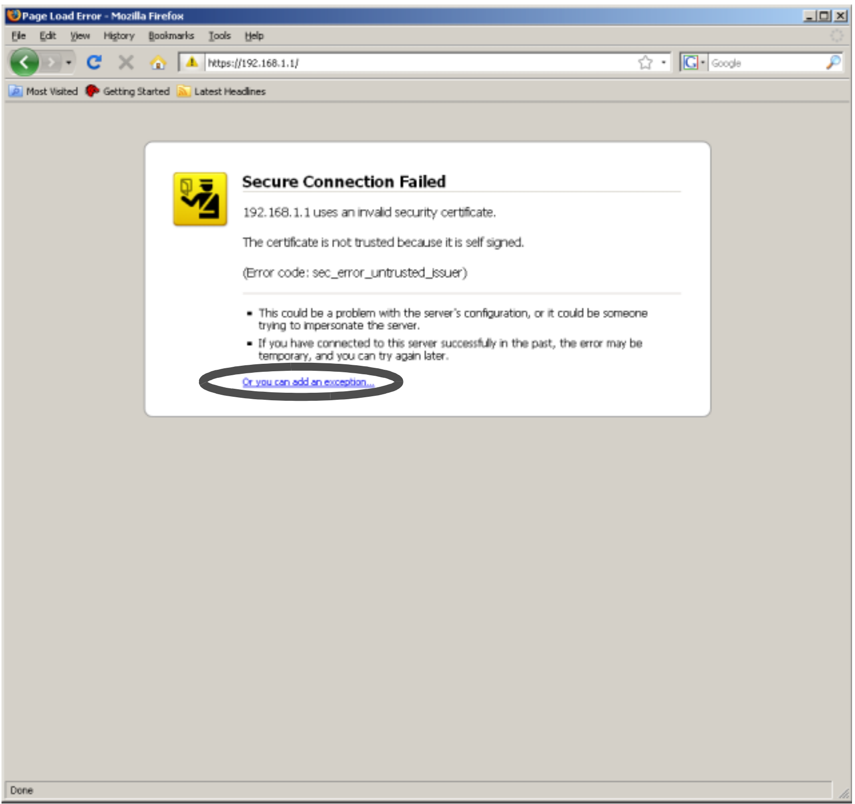
Procedure

1 Enter the URL to the address bar in the web browser.

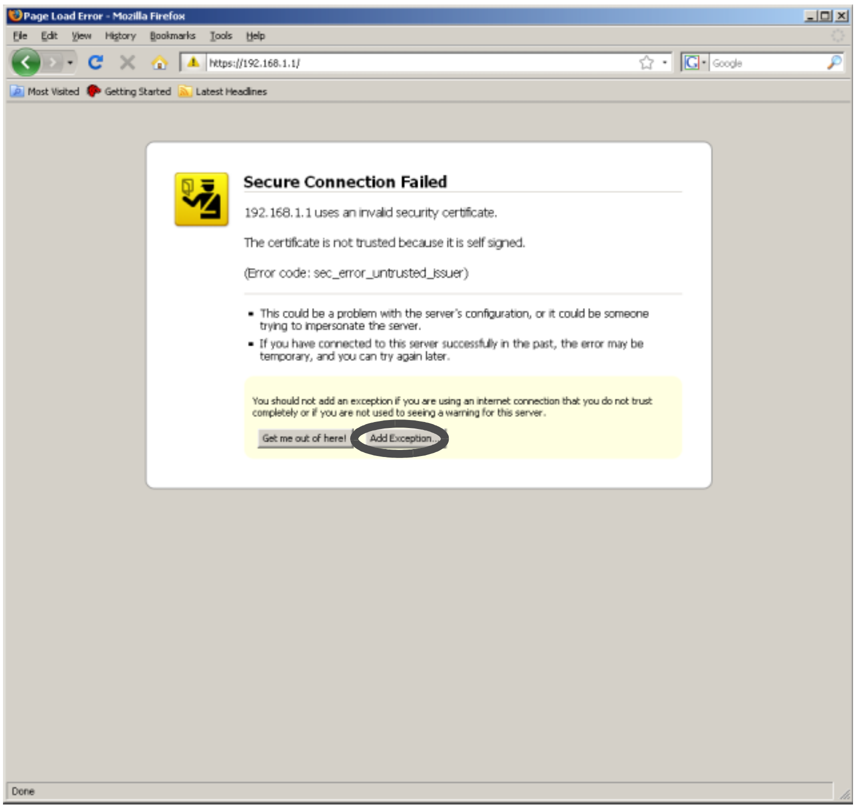
Specify "https://IP address of the ETERNUS DX Disk storage system" (Default IP address is "192.168.1.1").

→ A confirmation screen for security certificate appears.

2 Click the "Or you can add an exception..." link.

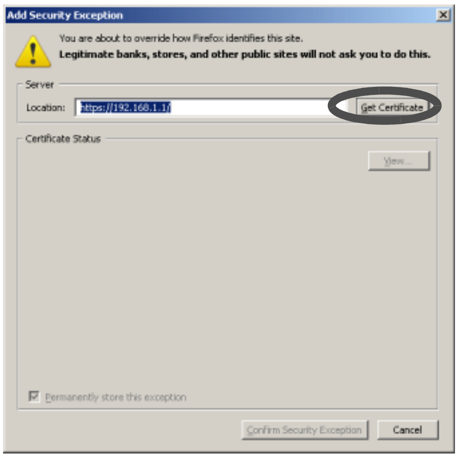


3 Click the [Add Exception...] button.



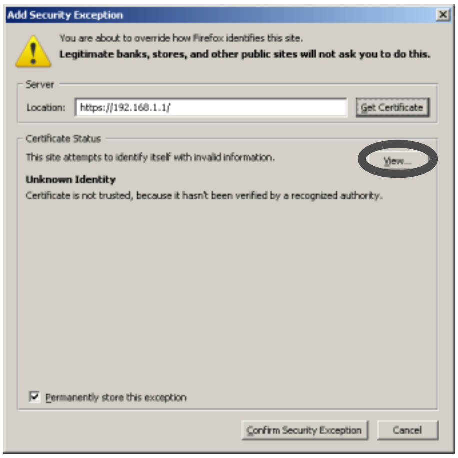
→ The [Add Exception] screen appears.

4 Click the [Get Certificate] button.



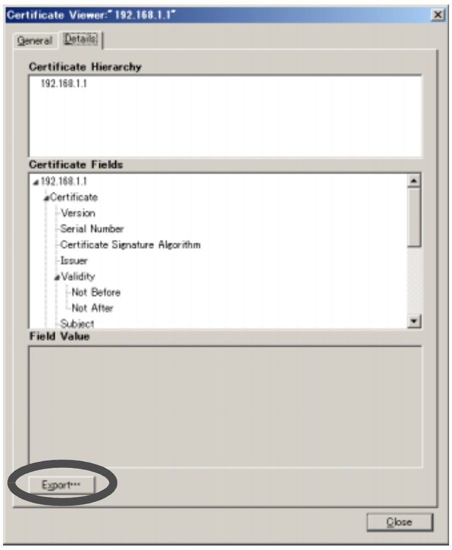
→ The status of certificate is displayed.

5 Click the [View...] button.



→ The [Certificate Viewer] screen appears.

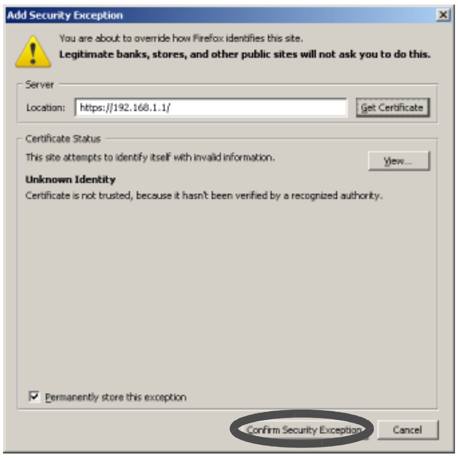
6 Click the [Export...] button on the [Details] tab.



7 Specify the file name and save the certificate.

→ Returns to the [Add Security Exception] screen.

8 Click the [Confirm Security Exception] button.



→ The security certificate is installed. Restart the web browser.

End of procedure

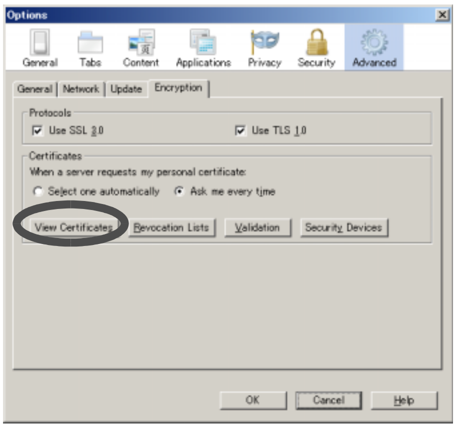
When a security certificate is already registered

Procedure

1 Enter the URL to the address bar in the web browser.

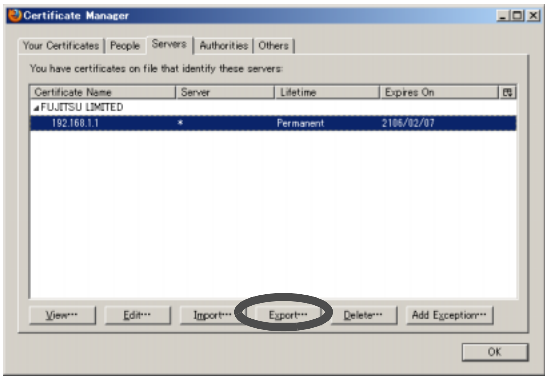
Specify "https://IP address of the ETERNUS DX Disk storage system" (Default IP address is "192.168.1.1").

2 Select [Tools] → [Options] → [Advanced], and click the [View Certificates] button on the [Encryption] tab.



→ The [Certificate Manager] screen appears.

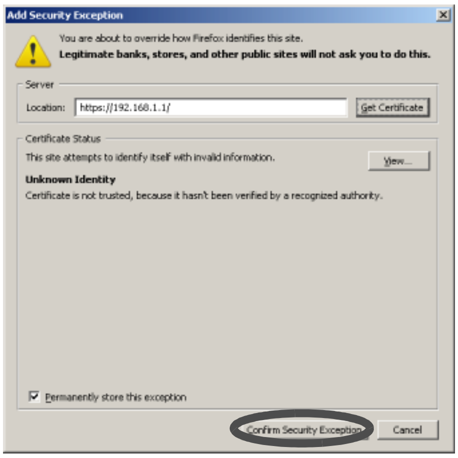
3 Select the certificate for the IP address of "ETERNUS server" on the [Servers] tab, and then click the [Export] button.



4 Specify the file name and save the certificate.

→ The [Add Security Exception] screen appears.

5 Click the [Confirm Security Exception] button.



→ The security certificate is installed. Restart the web browser.

End of procedure

Appendix D
Naming Conventions of Volumes and Hosts

This chapter describes the naming conventions for volumes and hosts.

D.1 Naming Convention of Volumes

Naming conventions for creating volumes

The following naming conventions apply when creating volumes:

- When creating multiple volumes, the specified "Name" and the suffix numbers "x" (serial numbers starting with "0") are automatically added to volumes.
  [Example]
  When specifying "StandardVolume" (14 characters) as the volume name
  Names such as "StandardVolume0" and "StandardVolume1" are used for new volumes.
- When the volume name including the suffix number "x" has more than 16 characters, the excess number of characters is deleted from the "Name", starting with the last character and a suffix number "~x" will be added. Then, the name will contain only 16 characters.
  [Example]
  When specifying "Standard_Volume0" (16 characters) as the volume name
  Names such as "Standard_Volume~0" and "Standard_Volume~1" are used for new volumes.
- When a volume name including the suffix number already exists, the suffix number is increased by one (+1). The suffix number is increased by one (+1) until no volume names overlap.

Naming conventions for renaming volumes

The following naming conventions apply when renaming volumes.

- When changing multiple volume names, the specified "Name" and the suffix numbers "x" are automatically added to volumes. Note that if the start suffix is "00" or "000", "0" will be added to the "Name".
  [Example]
  When specifying "StandardVolume" (14 characters) as the volume name and specifying "1" for "Start of Suffix"
  Names such as "StandardVolume1" and "StandardVolume2" are used for new volumes.
- When the volume name including the suffix number has more than 16 characters, the excess number of characters is deleted from the "Name", starting with the last character and a suffix number "~x" will be added. Then, the name will contain only 16 characters.
  [Example]
  When specifying "Standard_Volume1" (16 characters) as the volume name and specifying "100" for "Start of Suffix"
  Names such as "Standard_Volume~100" and "Standard_Volume~101" are used for new volumes.
- When a volume name including the suffix number already exists, the suffix number is increased by one (+1). The suffix number is increased by one (+1) until no volume names overlap.

D.2 Naming Convention of Hosts

Naming conventions for adding hosts

The following naming conventions apply when adding hosts:

- A name is automatically added to a host with the "host group name" and a suffix number "_x" (serial numbers starting with "0").
  [Example]
  When specifying "HOST_Group_001" (14 characters) as the host group name
  Names such as "HOST_Group_001_0" and "HOST_Group_001_1" are used for host groups.
- When the host name including the suffix number "_x" has more than 16 characters, the excess number of characters is deleted from the "host group name", starting with the last character and a suffix number "~x" will be added. Then, the name will contain only 16 characters.
  [Example]
  When specifying "HOST_Group_ABCDE" (16 characters) as the host group name
  Names such as "HOST_Group_ABC~0" and "HOST_Group_ABC~1" are used for host groups.
- When a host name including the suffix number already exists, the suffix number is increased by one (+1). The suffix number is increased by one (+1) until no host names overlap.
- The hosts, which were selected on the [Now Connected] screen, are named, and then the hosts, which were specified on the [Manual Input] screen, are named next.
- The name of the existing member host will not be changed.

Appendix E
Basic Size and MWC Input Condition for RAID Groups

This chapter describes the basic size for each RAID type and the input conditions for the Multi Writeback Count (MWC) of each RAID group.

E.1 Basic Size for each RAID Group

This section describes the basic size for each RAID type.
The allowed input for the basic size varies depending on the RAID type, the drive configuration, and the Stripe Depth value.

E.1.1 Basic Size when Using the Default Stripe Depth Value (For Standard, TPV, or SDPV Type Volumes)

When using the default Stripe Depth value, refer to the following table for basic size:

Basic size of each RAID group when using the default Stripe Depth value

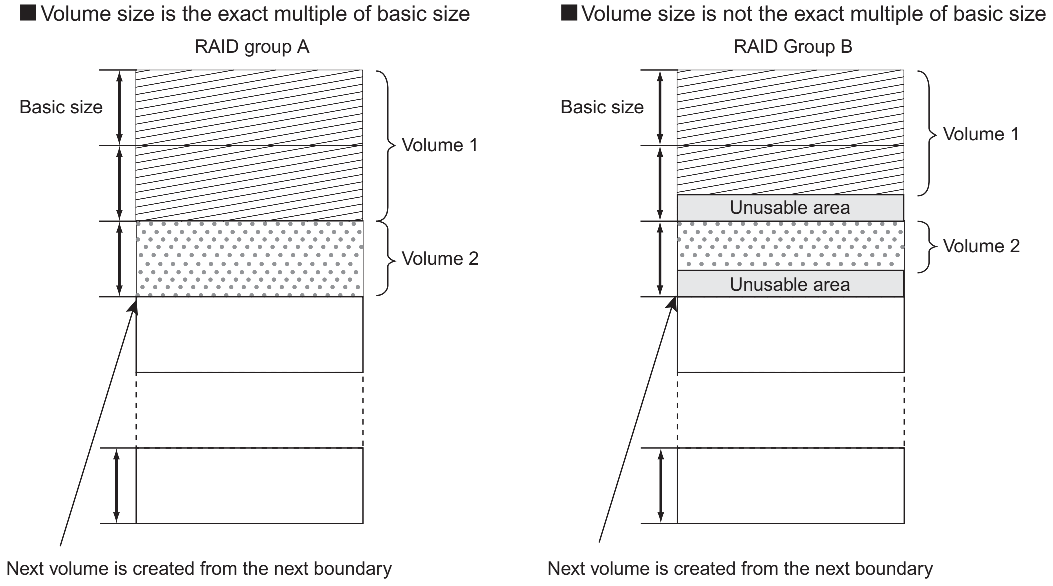
RAID type	Drive configuration (*1)	Basic size (MB) (Lowest exact MB multiple) (*2)
		(Stripe Depth = 64KB (default))
Mirroring (RAID1)	1D+1M	1
High Performance (RAID1+0)	2D+2M	1
	3D+3M	3
	4D+4M	1
	5D+5M	5
	6D+6M	3
	7D+7M	7
	8D+8M	1
	9D+9M	9
	10D+10M	5
	11D+11M	11
	12D+12M	3
	13D+13M	13
	14D+14M	7
	15D+15M	15
	16D+16M	1

RAID type	Drive configuration (*1)	Basic size (MB) (Lowest exact MB multiple) (*2)
		(Stripe Depth = 64KB (default))
High Capacity (RAID5)	2D+1P	1
	3D+1P	3
	4D+1P	1
	5D+1P	5
	6D+1P	3
	7D+1P	7
	8D+1P	1
	9D+1P	9
	10D+1P	5
	11D+1P	11
	12D+1P	3
	13D+1P	13
	14D+1P	7
	15D+1P	15
Reliability (RAID5+0)	(2D+1P) × 2	1
	(3D+1P) × 2	3
	(4D+1P) × 2	1
	(5D+1P) × 2	5
	(6D+1P) × 2	3
	(7D+1P) × 2	7
	(8D+1P) × 2	1
	(9D+1P) × 2	9
	(10D+1P) × 2	5
	(11D+1P) × 2	11
	(12D+1P) × 2	3
	(13D+1P) × 2	13
	(14D+1P) × 2	7
	(15D+1P) × 2	15
High Reliability (RAID6)	3D+2P	3
	4D+2P	1
	5D+2P	5
	6D+2P	3
	7D+2P	7
	8D+2P	1
	9D+2P	9
	10D+2P	5
	11D+2P	11
	12D+2P	3
	13D+2P	13
	14D+2P	7

*1: D: Data, M: Mirror, P: Parity

*2: Basic size when creating volumes.
ETERNUS DX80 S2/DX90 S2, ETERNUS DX410 S2/DX440 S2, and ETERNUS DX8100 S2/DX8700 S2 manages volumes in units of stripe size. If the volume size is not an exact multiple of the basic size (stripe size), then when a RAID group is created the remainder at the end of the last stripe used will be lost. Stripe size is independent of the disk drive capacity. Figure E.1 shows what happens when the volume size is an integral multiple of the basic size and what happens when it is not.

Figure E.1 Basic size when creating volumes



E.1.2 Basic Size when Using the Default Stripe Depth Value (For WSV Type Volumes)

When using the default Stripe Depth value, refer to the following table for basic size:

Basic size of each RAID group when using the default Stripe Depth value

For WSVs, the basic size is a multiple of the number of concatenations (the number of RAID groups that are to be concatenated).

When the Wide Stripe Size is "Normal"

RAID type	Drive configuration (*1)	Basic size (MB) (Lowest exact MB multiple) (*2)
		(Stripe Depth = 64KB (default))
Mirroring (RAID1)	1D+1M	16 × Number of concatenations
High Performance (RAID1+0)	2D+2M	16 × Number of concatenations
	3D+3M	255 × Number of concatenations
	4D+4M	16 × Number of concatenations
	5D+5M	255 × Number of concatenations
	6D+6M	63 × Number of concatenations
	7D+7M	63 × Number of concatenations
	8D+8M	16 × Number of concatenations
	9D+9M	63 × Number of concatenations
	10D+10M	125 × Number of concatenations
	11D+11M	253 × Number of concatenations
	12D+12M	63 × Number of concatenations
	13D+13M	247 × Number of concatenations
	14D+14M	63 × Number of concatenations
	15D+15M	255 × Number of concatenations
	16D+16M	16 × Number of concatenations
High Capacity (RAID5)	2D+1P	16 × Number of concatenations
	3D+1P	255 × Number of concatenations
	4D+1P	16 × Number of concatenations
	5D+1P	255 × Number of concatenations
	6D+1P	63 × Number of concatenations
	7D+1P	63 × Number of concatenations
	8D+1P	16 × Number of concatenations
	9D+1P	63 × Number of concatenations
	10D+1P	125 × Number of concatenations
	11D+1P	253 × Number of concatenations
	12D+1P	63 × Number of concatenations
	13D+1P	247 × Number of concatenations
	14D+1P	63 × Number of concatenations
	15D+1P	255 × Number of concatenations

RAID type	Drive configuration (*1)	Basic size (MB) (Lowest exact MB multiple) (*2)
		(Stripe Depth = 64KB (default))
Reliability (RAID5+0)	(2D+1P) × 2	16 × Number of concatenations
	(3D+1P) × 2	63 × Number of concatenations
	(4D+1P) × 2	16 × Number of concatenations
	(5D+1P) × 2	125 × Number of concatenations
	(6D+1P) × 2	63 × Number of concatenations
	(7D+1P) × 2	63 × Number of concatenations
	(8D+1P) × 2	16 × Number of concatenations
	(9D+1P) × 2	63 × Number of concatenations
	(10D+1P) × 2	15 × Number of concatenations
	(11D+1P) × 2	121 × Number of concatenations
	(12D+1P) × 2	15 × Number of concatenations
	(13D+1P) × 2	117 × Number of concatenations
	(14D+1P) × 2	63 × Number of concatenations
	(15D+1P) × 2	15 × Number of concatenations
High Reliability (RAID6)	3D+2P	255 × Number of concatenations
	4D+2P	16 × Number of concatenations
	5D+2P	255 × Number of concatenations
	6D+2P	63 × Number of concatenations
	7D+2P	63 × Number of concatenations
	8D+2P	16 × Number of concatenations
	9D+2P	63 × Number of concatenations
	10D+2P	125 × Number of concatenations
	11D+2P	253 × Number of concatenations
	12D+2P	63 × Number of concatenations
	13D+2P	247 × Number of concatenations
	14D+2P	63 × Number of concatenations

*1: D: Data, M: Mirror, P: Parity

*2: Basic size when creating volumes.
ETERNUS DX80 S2/DX90 S2, ETERNUS DX410 S2/DX440 S2, and ETERNUS DX8100 S2/DX8700 S2 manages volumes in units of stripe size. If the volume size is not an exact multiple of the basic size (stripe size), then when a RAID group is created the remainder at the end of the last stripe used will be lost. Stripe size is independent of the disk drive capacity. Figure E.1 shows what happens when the volume size is an integral multiple of the basic size and what happens when it is not.

When the Wide Stripe Size is "Small"

RAID type	Drive configuration (*1)	Basic size (MB) (Lowest exact MB multiple) (*2)
		(Stripe Depth = 64KB (default))
Mirroring (RAID1)	1D+1M	2 × Number of concatenations
High Performance (RAID1+0)	2D+2M	2 × Number of concatenations
	3D+3M	15 × Number of concatenations
	4D+4M	2 × Number of concatenations
	5D+5M	15 × Number of concatenations
	6D+6M	15 × Number of concatenations
	7D+7M	7 × Number of concatenations
	8D+8M	2 × Number of concatenations
	9D+9M	27 × Number of concatenations
	10D+10M	15 × Number of concatenations
	11D+11M	11 × Number of concatenations
	12D+12M	3 × Number of concatenations
	13D+13M	13 × Number of concatenations
	14D+14M	7 × Number of concatenations
	15D+15M	15 × Number of concatenations
	16D+16M	2 × Number of concatenations
High Capacity (RAID5)	2D+1P	2 × Number of concatenations
	3D+1P	15 × Number of concatenations
	4D+1P	2 × Number of concatenations
	5D+1P	15 × Number of concatenations
	6D+1P	15 × Number of concatenations
	7D+1P	7 × Number of concatenations
	8D+1P	2 × Number of concatenations
	9D+1P	27 × Number of concatenations
	10D+1P	15 × Number of concatenations
	11D+1P	11 × Number of concatenations
	12D+1P	3 × Number of concatenations
	13D+1P	13 × Number of concatenations
	14D+1P	7 × Number of concatenations
	15D+1P	15 × Number of concatenations

RAID type	Drive configuration (*1)	Basic size (MB) (Lowest exact MB multiple) (*2)
		(Stripe Depth = 64KB (default))
Reliability (RAID5+0)	(2D+1P) × 2	2 × Number of concatenations
	(3D+1P) × 2	15 × Number of concatenations
	(4D+1P) × 2	2 × Number of concatenations
	(5D+1P) × 2	15 × Number of concatenations
	(6D+1P) × 2	3 × Number of concatenations
	(7D+1P) × 2	7 × Number of concatenations
	(8D+1P) × 2	2 × Number of concatenations
	(9D+1P) × 2	9 × Number of concatenations
	(10D+1P) × 2	5 × Number of concatenations
	(11D+1P) × 2	11 × Number of concatenations
	(12D+1P) × 2	3 × Number of concatenations
	(13D+1P) × 2	13 × Number of concatenations
	(14D+1P) × 2	7 × Number of concatenations
	(15D+1P) × 2	15 × Number of concatenations
High Reliability (RAID6)	3D+2P	15 × Number of concatenations
	4D+2P	2 × Number of concatenations
	5D+2P	15 × Number of concatenations
	6D+2P	15 × Number of concatenations
	7D+2P	7 × Number of concatenations
	8D+2P	2 × Number of concatenations
	9D+2P	27 × Number of concatenations
	10D+2P	15 × Number of concatenations
	11D+2P	11 × Number of concatenations
	12D+2P	3 × Number of concatenations
	13D+2P	13 × Number of concatenations
	14D+2P	7 × Number of concatenations

*1: D: Data, M: Mirror, P: Parity

*2: Basic size when creating volumes.
ETERNUS DX80 S2/DX90 S2, ETERNUS DX410 S2/DX440 S2, and ETERNUS DX8100 S2/DX8700 S2 manages volumes in units of stripe size. If the volume size is not an exact multiple of the basic size (stripe size), then when a RAID group is created the remainder at the end of the last stripe used will be lost. Stripe size is independent of the disk drive capacity. Figure E.1 shows what happens when the volume size is an integral multiple of the basic size and what happens when it is not.

E.1.3 Basic Size When Stripe Depth is Tuned (For Standard, TPV, or SDPV Type Volumes)

Refer to the following table for the basic size of RAID groups when the Stripe Depth value is changed:

■ Basic size of each RAID group when the Stripe Depth value is tuned

RAID type	Drive configuration (*1)	Basic size (MB) (Lowest exact MB multiple) (*2)			
		When the Stripe Size is ...			
		128KB	256KB	512KB	1024KB
High Performance (RAID1+0)	2D+2M	1	1	1	2
	3D+3M	3	3	3	3
	4D+4M	1	1	2	4
	5D+5M	5	5	5	5
	6D+6M	3	3	3	6
	7D+7M	7	7	7	7
	8D+8M	1	2	4	8
	9D+9M	9	9	9	9
	10D+10M	5	5	5	10
High Performance (RAID1+0)	11D+11M	11	11	11	11
	12D+12M	3	3	6	12
	13D+13M	13	13	13	13
	14D+14M	7	7	7	14
	15D+15M	15	15	15	15
	16D+16M	2	4	8	16
High Capacity (RAID5)	2D+1P	1	1	1	–
	3D+1P	3	3	3	–
	4D+1P	1	1	2	–
	5D+1P	5	5	–	–
	6D+1P	3	3	–	–
	7D+1P	7	7	–	–
	8D+1P	1	2	–	–
	9D+1P	9	–	–	–
	10D+1P	5	–	–	–
	11D+1P	11	–	–	–
	12D+1P	3	–	–	–
	13D+1P	13	–	–	–
	14D+1P	7	–	–	–
	15D+1P	15	–	–	–

*1: D: Data, M: Mirror, P: Parity

*2: Basic size when creating volumes.
ETERNUS DX80 S2/DX90 S2, ETERNUS DX410 S2/DX440 S2, and ETERNUS DX8100 S2/DX8700 S2 manages volumes in units of stripe size. If the volume size is not an exact multiple of the basic size (stripe size), then when a RAID group is created the remainder at the end of the last stripe used will be lost. Stripe size is independent of the disk drive capacity. Figure E.1 shows what happens when the volume size is an integral multiple of the basic size and what happens when it is not.

E.1.4 Basic Size When Stripe Depth is Tuned (For WSV Type Volumes)

Refer to the following table for the basic size of RAID groups when the Stripe Depth value is changed:

■ Basic size of each RAID group when the Stripe Depth value is tuned

For WSVs, the basic size is a multiple of the number of concatenations (the number of RAID groups that are to be concatenated).

When the Wide Stripe Size is "Normal"

RAID type	Drive configuration (*1)	Basic size (MB) (Lowest exact MB multiple) (*2)			
		When the Stripe Size is ...			
		128KB	256KB	512KB	1024KB
High Performance (RAID1+0)	2D+2M	16 × Number of concatenations	16 × Number of concatenations	16 × Number of concatenations	16 × Number of concatenations
	3D+3M	63 × Number of concatenations	63 × Number of concatenations	15 × Number of concatenations	15 × Number of concatenations
	4D+4M	16 × Number of concatenations	16 × Number of concatenations	16 × Number of concatenations	16 × Number of concatenations
	5D+5M	125 × Number of concatenations	15 × Number of concatenations	15 × Number of concatenations	15 × Number of concatenations
	6D+6M	63 × Number of concatenations	15 × Number of concatenations	15 × Number of concatenations	12 × Number of concatenations
	7D+7M	63 × Number of concatenations	63 × Number of concatenations	14 × Number of concatenations	14 × Number of concatenations
	8D+8M	16 × Number of concatenations	16 × Number of concatenations	16 × Number of concatenations	16 × Number of concatenations
	9D+9M	63 × Number of concatenations	63 × Number of concatenations	27 × Number of concatenations	9 × Number of concatenations
	10D+10M	15 × Number of concatenations	15 × Number of concatenations	15 × Number of concatenations	10 × Number of concatenations
	11D+11M	121 × Number of concatenations	55 × Number of concatenations	11 × Number of concatenations	11 × Number of concatenations
	12D+12M	15 × Number of concatenations	15 × Number of concatenations	12 × Number of concatenations	12 × Number of concatenations
	13D+13M	117 × Number of concatenations	13 × Number of concatenations	13 × Number of concatenations	13 × Number of concatenations
	14D+14M	63 × Number of concatenations	14 × Number of concatenations	14 × Number of concatenations	14 × Number of concatenations

RAID type	Drive configuration (*1)	Basic size (MB) (Lowest exact MB multiple) (*2)			
		When the Stripe Size is ...			
		128KB	256KB	512KB	1024KB
High Performance (RAID1+0)	15D+15M	15 × Number of concatenations	15 × Number of concatenations	15 × Number of concatenations	15 × Number of concatenations
	16D+16M	16 × Number of concatenations	16 × Number of concatenations	16 × Number of concatenations	16 × Number of concatenations
High Capacity (RAID5)	2D+1P	16 × Number of concatenations	16 × Number of concatenations	16 × Number of concatenations	–
	3D+1P	63 × Number of concatenations	63 × Number of concatenations	15 × Number of concatenations	–
	4D+1P	16 × Number of concatenations	16 × Number of concatenations	16 × Number of concatenations	–
	5D+1P	125 × Number of concatenations	15 × Number of concatenations	–	–
	6D+1P	63 × Number of concatenations	15 × Number of concatenations	–	–
	7D+1P	63 × Number of concatenations	63 × Number of concatenations	–	–
	8D+1P	16 × Number of concatenations	16 × Number of concatenations	–	–
	9D+1P	63 × Number of concatenations	–	–	–
	10D+1P	15 × Number of concatenations	–	–	–
	11D+1P	121 × Number of concatenations	–	–	–
	12D+1P	15 × Number of concatenations	–	–	–
	13D+1P	117 × Number of concatenations	–	–	–
	14D+1P	63 × Number of concatenations	–	–	–
	15D+1P	15 × Number of concatenations	–	–	–

*1: D: Data, M: Mirror, P: Parity

*2: Basic size when creating volumes.
ETERNUS DX80 S2/DX90 S2, ETERNUS DX410 S2/DX440 S2, and ETERNUS DX8100 S2/DX8700 S2 manages volumes in units of stripe size. If the volume size is not an exact multiple of the basic size (stripe size), then when a RAID group is created the remainder at the end of the last stripe used will be lost. Stripe size is independent of the disk drive capacity. Figure E.1 shows what happens when the volume size is an integral multiple of the basic size and what happens when it is not.

When the Wide Stripe Size is "Small"

RAID type	Drive configuration (*1)	Basic size (MB) (Lowest exact MB multiple) (*2)			
		When the Stripe Size is ...			
		128KB	256KB	512KB	1024KB
High Performance (RAID1+0)	2D+2M	2 × Number of concatenations	2 × Number of concatenations	2 × Number of concatenations	2 × Number of concatenations
	3D+3M	15 × Number of concatenations	3 × Number of concatenations	3 × Number of concatenations	3 × Number of concatenations
	4D+4M	2 × Number of concatenations	2 × Number of concatenations	2 × Number of concatenations	4 × Number of concatenations
	5D+5M	15 × Number of concatenations	5 × Number of concatenations	5 × Number of concatenations	5 × Number of concatenations
	6D+6M	3 × Number of concatenations	3 × Number of concatenations	3 × Number of concatenations	6 × Number of concatenations
	7D+7M	7 × Number of concatenations	7 × Number of concatenations	7 × Number of concatenations	7 × Number of concatenations
	8D+8M	2 × Number of concatenations	2 × Number of concatenations	4 × Number of concatenations	8 × Number of concatenations
	9D+9M	9 × Number of concatenations	9 × Number of concatenations	9 × Number of concatenations	9 × Number of concatenations
	10D+10M	5 × Number of concatenations	5 × Number of concatenations	5 × Number of concatenations	10 × Number of concatenations
	11D+11M	11 × Number of concatenations	11 × Number of concatenations	11 × Number of concatenations	11 × Number of concatenations
	12D+12M	3 × Number of concatenations	3 × Number of concatenations	6 × Number of concatenations	12 × Number of concatenations
	13D+13M	13 × Number of concatenations	13 × Number of concatenations	13 × Number of concatenations	13 × Number of concatenations
	14D+14M	7 × Number of concatenations	7 × Number of concatenations	7 × Number of concatenations	14 × Number of concatenations
	15D+15M	15 × Number of concatenations	15 × Number of concatenations	15 × Number of concatenations	15 × Number of concatenations
	16D+16M	2 × Number of concatenations	4 × Number of concatenations	8 × Number of concatenations	16 × Number of concatenations
High Capacity (RAID5)	2D+1P	2 × Number of concatenations	2 × Number of concatenations	2 × Number of concatenations	-
	3D+1P	15 × Number of concatenations	3 × Number of concatenations	3 × Number of concatenations	-
	4D+1P	2 × Number of concatenations	2 × Number of concatenations	2 × Number of concatenations	-
	5D+1P	15 × Number of concatenations	5 × Number of concatenations	-	-
	6D+1P	3 × Number of concatenations	3 × Number of concatenations	-	-
	7D+1P	7 × Number of concatenations	7 × Number of concatenations	-	-

RAID type	Drive configuration (*1)	Basic size (MB) (Lowest exact MB multiple) (*2)			
		When the Stripe Size is ...			
		128KB	256KB	512KB	1024KB
High Capacity (RAID5)	8D+1P	2 × Number of concatenations	2 × Number of concatenations	–	–
	9D+1P	9 × Number of concatenations	–	–	–
	10D+1P	5 × Number of concatenations	–	–	–
	11D+1P	11 × Number of concatenations	–	–	–
	12D+1P	3 × Number of concatenations	–	–	–
	13D+1P	13 × Number of concatenations	–	–	–
	14D+1P	7 × Number of concatenations	–	–	–
	15D+1P	15 × Number of concatenations	–	–	–

*1: D: Data, M: Mirror, P: Parity

*2: Basic size when creating volumes.
ETERNUS DX80 S2/DX90 S2, ETERNUS DX410 S2/DX440 S2, and ETERNUS DX8100 S2/DX8700 S2 manages volumes in units of stripe size. If the volume size is not an exact multiple of the basic size (stripe size), then when a RAID group is created the remainder at the end of the last stripe used will be lost. Stripe size is independent of the disk drive capacity. Figure E.1 shows what happens when the volume size is an integral multiple of the basic size and what happens when it is not.

E.2 Input Conditions for MWC

This section describes the allowed input values for the Multi Writeback Count (MWC).
The allowed input for the MWC varies depending on the RAID type, the drive configuration, and the Stripe Depth value.

E.2.1 Allowed Input for the MWC When Using the Default Stripe Depth Value

When using the default Stripe Depth value, refer to the following table for the allowed MWC value:

Allowed input for MWC when using the default Stripe Depth value (Volume)

RAID type	Drive configuration (*1)	Allowed input for MWC (initial state)
		Stripe Depth = 64KB (default)
Striping (RAID0)	2D	1 – 16 (4)
	3D	1 – 10 (3)
	4D	1 – 8 (2)
	5D	1 – 6 (2)
	6D	1 – 5 (2)
	7D	1 – 4 (2)
	8D	1 – 4 (1)
	9D	1 – 3 (1)
	10D	1 – 3 (1)
	11D – 16D	1 – 2 (1)
Mirroring (RAID1)	1D+1M	1 – 16 (8)
High Performance (RAID1+0)	2D+2M	1 – 16 (4)
	3D+3M	1 – 10 (3)
	4D+4M	1 – 8 (2)
	5D+5M	1 – 6 (2)
	6D+6M	1 – 5 (2)
	7D+7M	1 – 4 (2)
	8D+8M	1 – 4 (1)
	9D+9M	1 – 3 (1)
	10D+10M	1 – 3 (1)
	11D+11M – 16D+16M	1 – 2 (1)

RAID type	Drive configuration (*1)	Allowed input for MWC (initial state)
		Stripe Depth = 64KB (default)
High Capacity (RAID5)	2D+1P	1 – 8 (4)
	3D+1P	1 – 8 (3)
	4D+1P	1 – 8 (2)
	5D+1P	1 – 6 (2)
	6D+1P	1 – 5 (2)
	7D+1P	1 – 4 (2)
	8D+1P	1 – 4 (1)
	9D+1P	1 – 3 (1)
	10D+1P	1 – 3 (1)
	11D+1P – 15D+1P	1 – 2 (1)
Reliability (RAID5+0)	(2D+1P) × 2	4 (fixed)
	(3D+1P) × 2	2 (fixed)
	(4D+1P) × 2	2 (fixed)
	(5D+1P) × 2 – (15D+1P) × 2	1 (fixed)
High Reliability (RAID6)	3D+2P	1 – 8 (3)
	4D+2P	1 – 8 (2)
	5D+2P	1 – 6 (2)
	6D+2P	1 – 5 (2)
	7D+2P	1 – 4 (2)
	8D+2P	1 – 4 (1)
	9D+2P	1 – 3 (1)
	10D+2P	1 – 3 (1)
	11D+2P – 14D+2P	1 – 2 (1)

*1: D: Data drives, M: Mirror drives, P: Parity drives

Allowed input for MWC when using the default Stripe Depth value (TPP)

RAID type	Drive configuration (*1)	Allowed input for MWC (initial state)
		Stripe Depth = 64KB (default)
Striping (RAID0)	4D	1 – 8 (2)
Mirroring (RAID1)	1D+1M	1 – 16 (8)
High Performance (RAID1+0)	2D+2M	1 – 16 (4)
	4D+4M	1 – 8 (2)
	8D+8M	1 – 4 (1)
	12D+12M	1 – 2 (1)
High Capacity (RAID5)	3D+1P	1 – 8 (3)
	4D+1P	1 – 8 (2)
	7D+1P	1 – 4 (2)
	8D+1P	1 – 4 (1)
	12D+1P	1 – 2 (1)

RAID type	Drive configuration (*1)	Allowed input for MWC (initial state)
		Stripe Depth = 64KB (default)
High Reliability (RAID6)	4D+2P	1 – 8 (2)
	6D+2P	1 –- 5 (2)
	8D+2P	1 – 4 (1)

*1: D: Data drives, M: Mirror drives, P: Parity drives

E.2.2 Allowed Input for the MWC when Performance is Tuned

Refer to the following table for the allowed MWC value when the Stripe Depth value is changed:

■ Allowed Input for MWC when the Stripe Depth value is tuned (Volume)

RAID type	Drive configuration (*1)	Allowed input for MWC (initial state)			
		When the Stripe Size is ...			
		128KB	256KB	512KB	1024KB
Striping (RAID0)	2D	1 – 8 (4)	1 – 4 (4)	1 – 2 (2)	1 (fixed)
	3D	1 – 5 (3)	1 – 2 (2)	1 (fixed)	1 (fixed)
	4D	1 – 4 (2)	1 – 2 (2)	1 (fixed)	1 (fixed)
	5D	1 – 3 (2)	1 (fixed)	1 (fixed)	1 (fixed)
	6D	1 – 2 (2)	1 (fixed)	1 (fixed)	1 (fixed)
	7D	1 – 2 (2)	1 (fixed)	1 (fixed)	1 (fixed)
	8D	1 – 2 (1)	1 (fixed)	1 (fixed)	1 (fixed)
	9D – 16D	1 (fixed)	1 (fixed)	1 (fixed)	1 (fixed)
High Performance (RAID1+0)	2D+2M	1 – 8 (4)	1 – 4 (4)	1 – 2 (2)	1 (fixed)
	3D+3M	1 – 5 (3)	1 – 2 (2)	1 (fixed)	1 (fixed)
	4D+4M	1 – 4 (2)	1 – 2 (2)	1 (fixed)	1 (fixed)
	5D+5M	1 – 3 (2)	1 (fixed)	1 (fixed)	1 (fixed)
	6D+6M	1 – 2 (2)	1 (fixed)	1 (fixed)	1 (fixed)
	7D+7M	1 – 2 (2)	1 (fixed)	1 (fixed)	1 (fixed)
	8D+8M	1 – 2 (1)	1 (fixed)	1 (fixed)	1 (fixed)
	9D+9M – 16D+16M	1 (fixed)	1 (fixed)	1 (fixed)	1 (fixed)
High Capacity (RAID5)	2D+1P	1 – 4 (4)	1 – 2 (2)	1 (fixed)	–
	3D+1P	1 – 4 (3)	1 – 2 (2)	1 (fixed)	–
	4D+1P	1 – 4 (2)	1 – 2 (2)	1 (fixed)	–
	5D+1P	1 – 3 (2)	1 (fixed)	–	–
	6D+1P	1 – 2 (2)	1 (fixed)	–	–
	7D+1P	1 – 2 (2)	1 (fixed)	–	–
	8D+1P	1 – 2 (1)	1 (fixed)	–	–
	9D+1P – 15D+1P	1 (fixed)	–	–	–

*1: D: Data drives, M: Mirror drives, P: Parity drives, –: Stripe Depth cannot be changed

Allowed Input for MWC when the Stripe Depth value is tuned (TPP)

RAID type	Drive configuration (*1)	Allowed input for MWC (initial state)			
		When the Stripe Size is ...			
		128KB	256KB	512KB	1024KB
Striping (RAID0)	4D	1 – 4 (2)	1 – 2 (2)	1 (fixed)	1 (fixed)
High Performance (RAID1+0)	2D+2M	1 – 8 (4)	1 – 4 (4)	1 – 2 (2)	1 (fixed)
	4D+4M	1 – 4 (2)	1 – 2 (2)	1 (fixed)	1 (fixed)
	8D+8M	1 – 2 (1)	1 (fixed)	1 (fixed)	1 (fixed)
	12D+12M	1 (fixed)	1 (fixed)	1 (fixed)	1 (fixed)
High Capacity (RAID5)	3D+1P	1 – 4 (3)	1 – 2 (2)	1 (fixed)	–
	4D+1P	1 – 4 (2)	1 – 2 (2)	1 (fixed)	–
	7D+1P	1 – 2 (2)	1 (fixed)	–	–
	8D+1P	1 – 2 (1)	1 (fixed)	–	–
	12D+1P	1 (fixed)	–	–	–

*1: D: Data drives, M: Mirror drives, P: Parity drives, –: Stripe Depth cannot be changed

Appendix F
Automatic Controlling CM-CPU Setting

This chapter describes controlling CM-CPU allocation if "Automatic" is specified when setting the controlling CM-CPU.

■ For ETERNUS DX80 S2/DX90 S2 and ETERNUS DX410 S2

RAID group number	Controlling CM-CPU assignment
Even numbers	CM#0 CPU#0
Odd numbers	CM#1 CPU#0

■ For ETERNUS DX440 S2, ETERNUS DX8100 S2/DX8700 S2 (2CM)

Remainder when dividing the RAID group number by "4" (*1)	Controlling CM-CPU assignment
0	CM#0 CPU#0
1	CM#1 CPU#1
2	CM#1 CPU#0
3	CM#0 CPU#1

*1: Divide the RAID group number by the number of CM-CPUs ("4").

■ For ETERNUS DX8700 S2 (4CM)

Remainder when dividing the RAID group number by "8" (*1)	Controlling CM-CPU assignment
0	CM#0 CPU#0
1	CM#3 CPU#1
2	CM#1 CPU#0
3	CM#2 CPU#1
4	CM#2 CPU#0
5	CM#1 CPU#1
6	CM#3CPU#0
7	CM#0 CPU#1

*1: Divide the RAID group number by the number of CM-CPUs ("8").

For ETERNUS DX8700 S2 (6CM)

Remainder when dividing the RAID group number by "12" (*1)	Controlling CM-CPU assignment
0	CM#0 CPU#0
1	CM#5 CPU#1
2	CM#1 CPU#0
3	CM#4 CPU#1
4	CM#2 CPU#0
5	CM#3 CPU#1
6	CM#3 CPU#0
7	CM#2 CPU#1
8	CM#4 CPU#0
9	CM#1 CPU#1
10	CM#5 CPU#0
11	CM#0 CPU#1

*1: Divide the RAID group number by the number of CM-CPUs ("12").

For ETERNUS DX8700 S2 (8CM)

Remainder when dividing the RAID group number by "16" (*1)	Controlling CM-CPU assignment
0	CM#0 CPU#0
1	CM#7 CPU#1
2	CM#1 CPU#0
3	CM#6 CPU#1
4	CM#2 CPU#0
5	CM#5 CPU#1
6	CM#3 CPU#0
7	CM#4 CPU#1
8	CM#4 CPU#0
9	CM#3 CPU#1
10	CM#5 CPU#0
11	CM#2 CPU#1
12	CM#6 CPU#0
13	CM#1 CPU#1
14	CM#7 CPU#0
15	CM#0 CPU#1

*1: Divide the RAID group number by the number of CM-CPUs ("16").

Appendix G
Using RADIUS Authentication

This chapter describes supplementary notes when using RADIUS Authentication.

G.1 Using RADIUS Authentication to Access the ETERNUS DX Disk Storage System

- RADIUS Authentication is used to authenticate logging in to the ETERNUS DX Disk storage system with GUI or CLI.
- Up to two RADIUS servers can be connected to an ETERNUS DX Disk storage system.
- To use RADIUS Authentication, the user account information (user name, password, and role name) that is allowed to access ETERNUS DX Disk storage system in the RADIUS server must be pre-registered.
- There are two types of authentication methods: CHAP and PAP.
- User roles are specified in the Vendor Specific Attribute (VSA) of the Access-Accept response from the server. The following table shows the syntax of the VSA based account role on the RADIUS server.

Syntax of the Vendor Specific Attribute (VSA) based account role

Item	Size (octets)	Value	Description
Type	1	26	Attribute number for the Vendor Specific Attribute
Length	1	7 or more	Attribute size (calculated by server)
Vendor-Id	4	211	Fujitsu Limited (SMI Private Enterprise Code)
Vendor type	1	1	Eternus-Auth-Role
Vendor length	1	2 or more	Attribute size described after the Vendor type (calculated by server)
Attribute-Specific	1 or more	ASCII characters	List of one or more role names assignable to successfully authenticated users (*1)

*1: The server-side role names are case sensitive and must be set correctly.
[Example] RoleName0

G.2 Notes when Using RADIUS Authentication for GUI

- A primary server and secondary server can be set for GUI authentication. If the primary RADIUS server times out, the secondary server is tried.
- If RADIUS Authentication fails and "Do not use Internal Authentication" has been selected for "Authentication Error Recovery", it will not be possible to login to GUI or CLI.
- When "Use Internal Authentication (Network Error Case)" has been selected for "Authentication Error Recovery", Internal Authentication is only performed if RADIUS Authentication fails on both primary and secondary RADIUS servers, and at least one of these failures is due to network error.
- So long as there is no RADIUS Authentication response the ETERNUS DX Disk storage system will keep retrying to authenticate the user for the entire "Timeout" period set on the "Set RADIUS Authentication (Initial)" menu. Authentication not succeeding before the timeout occurs is considered a RADIUS Authentication failure.
- When using RADIUS Authentication, if the role that is received from the server is unknown (not set) for the storage system, RADIUS Authentication fails.

G.3 Setting Up the RADIUS Server

Windows Server 2008 R2 Example

The RADIUS setup procedure described below uses a Windows Server 2008 R2 as an example. It must be noted that this setup procedure is not necessarily guaranteed to work for all network environments. Make sure to obtain your system administrator's help in setting up the system.

The procedure for setting up the RADIUS service on Windows Server 2008 R2 is as follows.

(1) Install the Network Policy and Access Services

For details on installing "Network Policy and Access Services", refer to the Microsoft web-site.

(2) Enable the Challenge Handshake Authentication Protocol (CHAP)

If CHAP Authentication is required, set Windows to store passwords using reversible encryption, rather than relying on the default setting.

Caution

If the current password is already stored by using irreversible encryption, the current password setting is not changed even when enabling the password to be stored by using reversible encryption. To use reversible encryption to store the current password, set the user password again or specify that the password for each user is changed for the next login.

(3) Configure the users

Network Policy Server (NPS) is the Microsoft implementation of a RADIUS server and proxy. When using NPS to check the User login certificate, a list of user groups is displayed instead of a list of specific users. Each user group must be associated with a role that logs into a specific ETERNUS DX Disk storage system. For example, after setting the "root", "Admin", and "user" user groups, those users that are to be allowed to login must be added to the proper group.

Create Users and User Groups

(1) Select [Start] → [Administrative Tools] → [Computer Management].

(2) Select [System Tools] → [Local Users and Groups] → [Users].
Right-click [Users] and select [New User].
Create an ETERNUS DX Disk storage system login user as the [New User].

(3) Select [System Tools] → [Local Users and Groups] → [Groups].
Right-click [Groups] and select [New Group].
Create an ETERNUS DX Disk storage system group as the [New Group] and add the user created in Step (2).

(4) Set the Network Policy and Access Services
The following three steps must be performed:
- Register the ETERNUS DX Disk storage system as a RADIUS client
- Set the accessible user group and the authentication method
- Set the role with Vendor Specific Attribute (VSA)

Register the ETERNUS DX Disk storage system as a RADIUS client

(1) Select [Start] → [Administrative Tools] → [Server Manager].

(2) Select [Roles] → [Network Policy and Access Services] → [NPS] → [RADIUS Clients and Servers] → [RADIUS Clients].
Right-click [RADIUS Clients] and select [New RADIUS Client], and set the various items.
- For the "Address (IP or DNS)", set the IP address of the client ETERNUS DX Disk storage system.
- For the "Vendor name", set "RADIUS Standard".
- For the "Shared secret", set the shared key that is registered on the client ETERNUS DX Disk storage system.

Set the Accessible User Group and the Authentication Method

(1) Select [Start] → [Administrative Tools] → [Server Manager].

(2) Select [Roles] → [Network Policy and Access Services] → [NPS] → [Policies] → [Network Policies].
Right-click [Network Policies], select [New], and set the various items.
- Click "Add" in the "Conditions" tab and add "Windows Groups". For "Windows Groups", add the group that was created for the ETERNUS DX Disk storage system.
- For the "secure authentication methods", check "Encryption authentication (CHAP(C))" or "Unencrypted authentication (PAP,SPAP) (S)". Select the same setting as is set on the ETERNUS DX Disk storage system.

- Set the role with Vendor Specific Attribute (VSA)

(1) Select [Start] → [Administrative Tools] → [Server Manager].

(2) Select [Roles] → [Network Policy and Access Services] → [NPS] → [Policies] → [Network Policies].
Select and double-click the newly added policy.

(3) Set the following items using the [Add] button under [Vendor Specific] on the [Settings] tab.
- For the "Attributes", add "Vendor-Specific/RADIUS Standard".
- For the "Enter Vendor Code", enter "211".
- For the "RADIUS RFC", click "Yes, it conforms".
- For the "Vendor-assigned attribute number", enter "1".
- For the "Attribute format", select "String".
- For the "Attribute Value", enter the role name(s) that are registered on the ETERNUS DX Disk storage system, and which the users who belong to the added "Groups" can select when logging in to the ETERNUS DX Disk storage system. The server-side role names are case sensitive and must be input correctly.
[Example] RoleName0

Appendix H
Estimated Advanced Copy Source Capacity

This chapter describes the maximum copy source capacity for each copy type.
The estimated values in the following tables are examples of typical Advanced Copy sessions (the maximum memory area required for Advanced Copy management is secured and the number of copy sessions is 400).
Actual values can be calculated by using the procedure in "How to calculate the copy table size" (page 308) of "8.2.7 Modify Copy Table Size" (page 301).

ETERNUS DX Disk storage system	Copy type	Resolution				
		× 1	× 2	× 4	× 8	× 16
ETERNUS DX80 S2/ DX90 S2 (Table size = 256MB)	EC/REC (*1)/ OPC, QuickOPC, SnapOPC, and SnapOPC+ without using Restore OPC	16184GB (15.8TB)	32368GB (31.6TB)	64736GB (63.2TB)	129472GB (126.4TB)	258944GB (252.8TB)
	OPC, QuickOPC, SnapOPC, and SnapOPC+ using Restore OPC	7992GB (7.8TB)	15984GB (15.6TB)	31968GB (31.2TB)	63936GB (62.4TB)	127872GB (124.8TB)
ETERNUS DX410 S2 (Table size = 512MB)	EC/REC/ OPC, QuickOPC, SnapOPC, and SnapOPC+ without using Restore OPC	32568GB (31.8TB)	65136GB (63.6TB)	130272GB (127.2TB)	260544GB (254.4TB)	521088GB (508.8TB)
	OPC, QuickOPC, SnapOPC, and SnapOPC+ using Restore OPC	16184GB (15.8TB)	32368GB (31.6TB)	64736GB (63.2TB)	129472GB (126.4TB)	258944GB (252.8TB)
ETERNUS DX440 S2 (Table size = 1024MB [1GB])	EC/REC/ OPC, QuickOPC, SnapOPC, and SnapOPC+ without using Restore OPC	65336GB (63.8TB)	130672GB (127.6TB)	261344GB (255.2TB)	522688GB (510.4TB)	1045376GB (1020.8TB)
	OPC, QuickOPC, SnapOPC, and SnapOPC+ using Restore OPC	32568GB (31.8TB)	65136GB (63.6TB)	130272GB (127.2TB)	260544GB (254.4TB)	521088GB (508.8TB)

ETERNUS DX Disk storage system	Copy type	Resolution				
		× 1	× 2	× 4	× 8	× 16
ETERNUS DX8700 S2 (Table size = 12288MB [12GB])	EC/REC/ OPC, QuickOPC, SnapOPC, and SnapOPC+ without using Restore OPC	786232GB (767.8TB)	1572464GB (1535.6TB)	3144928GB (3071.2TB)	6289856GB (6142.4TB)	12579712GB (12284.9TB)
	OPC, QuickOPC, SnapOPC, and SnapOPC+ using Restore OPC	393016GB (383.8TB)	786032GB (767.6TB)	1572064GB (1535.2TB)	3144128GB (3070.4TB)	6288256GB (6140.9TB)

(Values in brackets assume that 1024GB = 1TB and are displayed to one decimal place.)

*1: REC is only available for the ETERNUS DX90 S2.

Note

The copy source capacity is assumed that almost 100% of the copy table size is used.

Appendix I
Storage Migration Setting Files

This chapter describes Storage Migration setting files.

I.1 Template File for Storage Migration Settings

The following table shows the details of a template file for storage migration settings.

Keyword			Number of settings	Allowed input
Type	Specify the type of Storage Migration. (Example) Type = Open		1	Open
GROUP	Specify a path group for each source storage system. Up to 16 path groups can be specified. • New format Specify "0x" (2-digit) + 0 - F (1-digit) with hexadecimal numbers. [Example] GROUP=0x0 • Old format Specify 0 - F (1-digit) with hexadecimal numbers. [Example] GROUP=0		1	• New format 0x0 - 0xF ("0x" + 1-digit hexadecimal) • Old format 0 - F (1-digit hexadecimal)
	OPE-MODE	[New format only] Specify one of the operation modes (M/M+QC/M+FC/QC/FC) for the Storage Migration. The following symbols are used for the operation modes: M: Migration M+QC: Migration + Quick Compare M+FC: Migration + Full Compare QC: Quick Compare FC: Full Compare OPEMODE can be omitted. When this parameter is not specified, "Migration" is used. Refer to "Operation Mode" (page 1021) for details. [Example] OPEMODE=M+QC **Caution** OPEMODE is available only when using a template file with the new format. When a template file with an old format is used, the conventional mode ("Migration") is used.	1	M M+QC M+FC QC FC

<table>
<tr><th colspan="4">Keyword</th><th>Number of settings</th><th>Allowed input</th></tr>
<tr><td rowspan="7">GROUP</td><td rowspan="3">PATH</td><td colspan="2">Specify the path information of the destination and source storage systems.
Up to 8 paths per path group can be specified.
[Example]
PATH=CMx,CAy,Pz,wwwwwwwwwwwwwwww
x: CM number, y: CA number, z: Port number
wwwwwwwwwwwwwwww: WWN</td><td rowspan="3">4</td><td>–</td></tr>
<tr><td>CM
CA
P</td><td>Specify the location information (CMx, CAy, Pz) of the destination FC-Initiator port to which the path is configured.</td><td>CMx, CAy, Pz
x: CM number
y: CA number
z: Port number</td></tr>
<tr><td>WWN</td><td>Specify the World Wide Name (WWN) of the source FC-Initiator port to which the path is configured.</td><td>16-digit hexadecimal</td></tr>
<tr><td rowspan="4">VOL</td><td colspan="2" rowspan="2">[New format]
Specify the source LUN (Y) and the destination volume (Z).
The maximum number of source LUNs for each migration path (PATH) is 512.
[Example] VOL=Y, Z

Example of specifying source LUNs and destination volumes
<table><tr><th>Source LUN</th><th>Destination volume</th></tr><tr><td>Input a decimal number
Specification method: "0x" is not added on top of the value.
Decimal numbers can be used only when the source LUN is from "0" to "255".</td><td>Input a decimal number
Specification method: "0x" is not added on top of the value.</td></tr><tr><td>Input a hexadecimal number (4-digit)
Specification method: Add "0x" on top of the value.
Input in "0xYYYY" format.</td><td rowspan="2">Input a hexadecimal number (4-digit)
Specification method: Add "0x" on top of the value.
Input in "0xZZZZ" format.</td></tr><tr><td>Input a hexadecimal number (16-digit)
Specification method: Add "0x" on top of the value.
Input in "0xYYYYYYYYYYYYYYYY" format.</td></tr></table>
Caution
Specifying VOL with a decimal number is only available when a template file with the new format is used. When using a template file with the old format, use a 4-digit hexadecimal as the conventional method.</td><td rowspan="2"></td><td>Source LUN:
0 - 255
(decimal)

0xYYYY
(4-digit hexadecimal)

0xYYYYYYYYYYYYYYYY
(16-digit hexadecimal)</td></tr>
<tr><td>Destination volume:
Z (decimal)

0xZZZZ
(4-digit hexadecimal)</td></tr>
<tr><td colspan="2" rowspan="2">[Old format]
Specify the source LUN (xxxx) and the destination volume (yyyy).
The maximum number of source LUNs for each migration path (PATH) is 512.
[Example] VOL=xxxx, yyyy</td><td rowspan="2">2</td><td>Source LUN:
0000 - 01FF
(4-digit hexadecimal)</td></tr>
<tr><td>Destination volume: 0000 - 3FFF
(4-digit hexadecimal)</td></tr>
</table>

Operation Mode

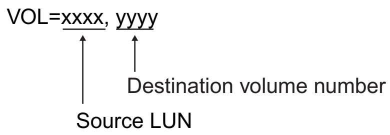
The following table explains the details of the operation mode.

<table>
<tr><th colspan="2">OPEMODE</th><th rowspan="2">Description</th></tr>
<tr><th>Specification code</th><th>Meaning</th></tr>
<tr><td>M</td><td>Migration</td><td>Data migration from the source storage system to the destination storage system is performed.</td></tr>
<tr><td>M+QC</td><td>Migration +
Quick Compare</td><td>Data migration from the source storage system to the destination storage system and a data comparison of source LUNs and destination volumes are performed. "Quick Compare" compares data in a part of the volume area. "Migration + Quick Compare" consecutively executes "data migration" and "data comparison" for each volume.</td></tr>
<tr><td>M+FC</td><td>Migration +
Full Compare</td><td>Data migration from the source storage system to the destination storage system and a data comparison of source LUNs and destination volumes are performed. "Full Compare" compares data in entire volume area. "Migration + Full Compare" consecutively executes "data migration" and "data comparison" for each volume.
Caution
• Host access to the destination storage system must be stopped when "Migration + Full Compare" is specified.
• When "Migration + Full Compare" is specified for the operation mode, the time to complete the operation after data migration is increased significantly.</td></tr>
<tr><td>QC</td><td>Quick Compare</td><td>A data comparison of source LUNs and destination volumes is performed. "Quick Compare" compares data in a part of the volume area.</td></tr>
<tr><td>FC</td><td>Full Compare</td><td>A data comparison of source LUNs and destination volumes is performed. "Full Compare" compares data in entire volume area.
and "data comparison" for each volume.
Caution
• Host access to the destination storage system must be stopped when "Full Compare" is specified.
• When "Full Compare" is specified for the operation mode, the time to complete the operation after data migration is increased significantly.</td></tr>
</table>

I.2 Coding Conventions for the Storage Migration Setting File

The following table shows the coding conventions for a Storage Migration setting file.

Keyword	Coding conventions
Common	• The Storage Migration setting file must be saved in the text format. • Contents of the file must be described in alphanumeric characters. • A keyword (Type, GROUP, OPEMODE, PATH, VOL) and its setting value must be connected with "=" (equal). (*1) • Only a tab or space can be placed before a keyword (Type, GROUP, OPEMODE, PATH, VOL). (*1) • The number of setting values assigned to a keyword (Type, GROUP, OPEMODE, PATH, VOL) with "=" must coincide with the number specified for each keyword. For more information on the number of setting values for each keyword, refer to "I.1 Template File for Storage Migration Settings" (page 1019) (*1). • Add the following information for each GROUP. PATH (CMx, CAy, Pz, WWN), VOL • There must not be an overlap with the content of the Storage Migration setting file or the migration information (GROUP, destination CA port, source WWN, source LUN, or destination volume) of the path already configured. *1: "OPEMODE" is only available when using a template file with the new format.
GROUP	• Up to 16 GROUPs can be specified. • For the setting range for each GROUP, refer to "I.1 Template File for Storage Migration Settings" (page 1019).
OPEMODE	• Specify "M", "M+QC", "M+FC", "QC", or "FC" for each GROUP (when OPEMODE is omitted, it is regarded as though "M" is specified and only migration is performed). • For the setting range for each OPEMODE, refer to "I.1 Template File for Storage Migration Settings" (page 1019).
PATH	• Enclose the PATH and VOL for each GROUP with "{ }" (bracket symbols). • Describe all "PATHs" and then all "VOLs" for each GROUP. • Up to 8 PATHs per GROUP can be specified. • Separate the PATH setting values with "," (comma). • For the setting range of PATH, refer to "I.1 Template File for Storage Migration Settings" (page 1019). • Describe the PATH in the following order. PATH=CMx, CAy, Pz, wwwwwwwwwwwwwwww WWN for the source FC-CA port CM#, CA#, and Port# for the destination FC-Initiator port • Start a new line for each PATH. Multiple PATHs cannot be described without breaking.

Keyword	Coding conventions
VOL	• Keep the number of VOLs to 512 or less, so they can be accessed from the source FC-CA port. • Separate the VOL setting values with "," (comma). • For the setting range of VOL, refer to "I.1 Template File for Storage Migration Settings" (page 1019). • Describe the VOL in the following order.  • Start a new line for each VOL. Multiple VOLs cannot be described without breaking.
Other information	• Entered letters are not case-sensitive. • A line that starts with "#" is a comment. • A file can be any text string.

I.3 Setting Example of the Storage Migration Setting File

A setting example of the Storage Migration setting file (in the new format) is shown below:

```
# Setting Example
eternus-storage-migration-0101
Type=Open

GROUP=0
OPEMODE=M+QC

{

  PATH=CM0,CA0,P0,0000000011111111
  PATH=CM1,CA0,P1,2222222233333333
  VOL=0x0000,0x0040
  VOL=0x0001,0x0041
  VOL=0x00FF,0x013F

}

GROUP=1
OPEMODE=M+QC

{

  PATH=CM0,CA1,P0,8888888888888888
  VOL=4,10

}

GROUP=2
OPEMODE=M

{

  PATH=CM0,CA1,P1,9999999999999999
  VOL=0x0000011000000000,0x0141

}
```

The above example describes the case where the following paths and migration volumes are configured for three source storage systems (GROUP#0, 1, 2).

Path group (OPEMODE)	Migration information		
GROUP=0 (M+QC)	Path	Location information of the destination FC-Initiator port	WWN for the source FC-CA port
		CM0,CA0,P0	0000000011111111
		CM1,CA0,P1	2222222233333333
	Migration volume	Source LUN	Destination volume number
		0x0000	0x0040
		0x0001	0x0041
		0x00FF	0x013F
GROUP=1 (M+QC)	Path	Location information of the destination FC-Initiator port	WWN for the source FC-CA port
		CM0,CA1,P0	8888888888888888
	Migration volume	Source LUN	Destination volume number
		4	10
GROUP=2 (M)	Path	Location information of the destination FC-Initiator port	WWN for the source FC-CA port
		CM0,CA1,P1	9999999999999999
	Migration volume	Source LUN	Destination volume number
		0x0000011000000000	0x0141

A setting example of the Storage Migration setting file (in the old format) is shown below:

```
# Setting Example
Type=Open

GROUP=0

{

  PATH=CM0,CA0,P0,0000000011111111
  PATH=CM1,CA0,P1,2222222233333333
  VOL=0000,0040
  VOL=0001,0041
  VOL=00FF,013F

}

GROUP=1

{

  PATH=CM0,CA1,P0,8888888888888888
  PATH=CM0,CA1,P1,9999999999999999
  PATH=CM1,CA1,P0,aaaaAAAAbbbbBBBB
  PATH=CM1,CA1,P1,EEEEeeeeFFFFffff
  VOL=0100,0140
  VOL=0101,0141
  VOL=01FF,023F

}
```

The above example describes the case where the following paths and migration volumes are configured for two sets of source storage systems (GROUP#0, 1).

Path group	Migration information		
GROUP=0	Path	Location information of the destination FC-Initiator port	WWN for the source FC-CA port
		CM0,CA0,P0	0000000011111111
		CM1,CA0,P1	2222222233333333
	Migration volume	Source LUN	Destination volume number
		0000	0040
		0001	0041
		00FF	013F
GROUP=1	Path	Location information of the destination FC-Initiator port	WWN for the source FC-CA port
		CM0,CA1,P0	8888888888888888
		CM0,CA1,P1	9999999999999999
		CM1,CA1,P0	aaaaAAAAbbbbBBBB
		CM1,CA1,P1	EEEEeeeeFFFFffff
	Migration volume	Source LUN	Destination volume number
		0100	0140
		0101	0141
		01FF	023F

Appendix J
Factory Default List

This chapter describes the default settings for the following management functions.

- Advanced Copy
- Connectivity
- System

The following table shows the factory default values. Note that functions and setting items that do not have default settings are not listed in the following tables.

J.1 Advanced Copy

Function	Setting item	Default value	Allowed input
Register Advanced Copy License	Registration Method	Input License Key	For ETERNUS DX80 S2/DX90 S2 • Input License Key • Use Free License/VAAI For ETERNUS DX410 S2/DX440 S2 and ETERNUS DX8100 S2/DX8700 S2 • Input License Key • Use VAAI
Modify EC/OPC Priority	EC/OPC Priority	Automatic Priority	• Automatic Priority • High Priority • Middle Priority • Low Priority • Very Low Priority
	Copy Schedule Mode	Session Balancing	• Session Balancing • Destination RAID Group Balancing
Modify Copy Table Size	Resolution	× 1	• × 1 • × 2 • × 4 • × 8 • × 16

Function	Setting item	Default value	Allowed input
Modify Copy Table Size	Table Size (MB)	0	For ETERNUS DX80 S2/DX90 S2 • 0 – 256 For ETERNUS DX410 S2 • 0 – 512 For ETERNUS DX440 S2 • 0 – 4096 For ETERNUS DX8100 S2 • 0 – 1024 For ETERNUS DX8700 S2 • 0 – 12288
	Table Size Threshold (%)	80	• 1 – 100
ODX	Operation mode	Disable	• Enable • Disable The ODX function is disabled by default and only the [Enable ODX] function is available.
Create ODX Buffer Volume	(Unit)	GB	• TB • GB • MB
	Type	Standard	• Standard • Thin Provisioning
	Use all Largest Free Space	Cleared	Enable • Selected Use the largest available free space • Cleared Do not use the largest available free space
	Encryption by CM	When the encryption mode is enabled • Off When the encryption mode is disabled • Not displayed	• On • Off • Not displayed
	Radio buttons to select a RAID group (when "Type" is "Standard")	Off	• On Select a RAID group • Off Do not select a RAID group
	Radio buttons to select a TPP (when "Type" is "Thin Provisioning")	Off	• On Select a Thin Provisioning Pool • Off Do not select a Thin Provisioning Pool

Function	Setting item	Default value	Allowed input
Modify Copy Parameters	Policy Level 1 (Informational) Threshold	50	• 1 – 97 (%)
	Policy Level 2 (Warning) Threshold	70	• 2 – 98 (%)
	Policy Level 3 (Error) Threshold	99	• 3 – 99 (%)
	SDPE	1	• 1 (GB) • 2 (GB) • 4 (GB)
Set Copy Path	Operation Mode	Create Copy Path	• Create Copy Path • Apply Copy Path
	Base Information	Backup Path File	• Backup Path File • Path File • Not use
	Initiator / Target Setting (for ETERNUS6000)	Initiator	• Initiator • Target
	IP Version	IPv4	• IPv4 • IPv6 (Link Local) • IPv6 (Connect IP)
	Device Type	ETERNUS DX8700 S2	• ETERNUS DX8700 S2 • ETERNUS DX8100 S2 • ETERNUS DX410 S2/DX440 S2 • ETERNUS DX90 S2 • ETERNUS DX90 • ETERNUS DX410/DX440/DX8100/ DX8400/DX8700 • ETERNUS4000/ETERNUS8000 MODEL400/600/800/1200/2200 • ETERNUS4000/ETERNUS8000 MODEL300/500/700/900/1100/ 2100 • ETERNUS6000
	Connection Type	Direct	• Remote • Direct
	Link Speed	1	• 1 – 65535 (Mbit/s)
	(Line setting)	Cleared	• Selected A copy path is specified • Cleared A copy path is not specified The checkbox is displayed only for combinations of paths that can be used to specify a copy path.

Function	Setting item	Default value	Allowed input
Modify REC Multiplicity	Priority Level	When "Connection Type" is "Direct" • Auto When "Connection Type" is "Remote" • "-" (hyphen)	When "Connection Type" is "Direct" • Auto • 1 (corresponds to "Very Low Priority") • 2 (corresponds to "Low Priority") • 3 • 4 • 5 • 6 • 7 • 8 (corresponds to "High Priority")
Modify REC Multiplicity	Specification Mode	When "Connection Type" is "Remote" • Auto When "Connection Type" is "Direct" • "-" (hyphen)	When "Connection Type" is "Remote" • Auto • Manual
	Multiplicity	When "Specification Mode" is "Manual" • 1 When "Specification Mode" is "Auto" • "-" (hyphen)	When "Specification Mode" is "Manual" • 1 – 1024
	Copy Schedule Mode	Session Balancing	• Session Balancing • Destination RAID Group Balancing
Modify REC Buffer	Usage	Unused	• Send • Receive • Unused
	Remote Box ID	When "Usage" is "Send" or "Receive" • Remote Box ID When "Usage" is "Unused" • "-" (hyphen)	When "Usage" is "Send" or "Receive" • Remote Box ID

Function	Setting item	Default value	Allowed input
Modify REC Buffer	Size	When "Usage" is "Send" or "Receive" • 128 MB When "Usage" is "Unused" • "-" (hyphen)	When "Usage" is "Send" or "Receive" • For ETERNUS DX90 S2 - 128 MB - 256 MB - 512 MB • For ETERNUS DX410 S2/DX440 S2 - 128 MB - 256 MB - 512 MB - 1024 MB - 2048 MB • For ETERNUS DX8100 S2/DX8700 S2 - 128 MB - 256 MB - 512 MB - 1024 MB - 2048 MB
	Forwarding Interval	When "Usage" is "Send" or "Receive" • 1 sec. When "Usage" is "Unused" • "-" (hyphen)	When "Usage" is "Send" or "Receive" • 1 sec. • 2 sec. • 4 sec. • 8 sec. • 15 sec. • 30 sec. • 45 sec. • 60 sec. • 75 sec. • 90 sec. • 105 sec. • 120 sec.

Function	Setting item	Default value	Allowed input
Modify REC Buffer	Monitoring Time	When "Usage" is "Send" or "Receive" • 5 min. When "Usage" is "Unused" • "-" (hyphen)	When "Usage" is "Send" or "Receive" • 0 min. • 1 min. • 2 min. • 3 min. • 4 min. • 5 min. • 6 min. • 7 min. • 8 min. • 9 min. • 10 min. • 11 min. • 12 min. • 13 min. • 14 min. • 15 min.
	HALT Wait Timer	When "Usage" is "Send" or "Receive" • 15 sec. When "Usage" is "Unused" • "-" (hyphen)	When "Usage" is "Send" or "Receive" • 0 sec. • 5 sec. • 10 sec. • 15 sec.
	I/O Priority Mode	When "Usage" is "Send" or "Receive" • Disable When "Usage" is "Unused" • "-" (hyphen)	When "Usage" is "Send" or "Receive" • Enable • Disable
	Immediate HALT Mode	When "Usage" is "Send" or "Receive" • Disable When "Usage" is "Unused" • "-" (hyphen)	When "Usage" is "Send" or "Receive" • Enable • Disable
Create REC Disk Buffer	Controlling CM	Automatic	• Automatic • CM#x CPU#y (x: CM number, y: CPU number)
	Encryption by CM	Off	• On • Off
	Stripe Depth	64KB	• 64KB • 128KB • 256KB • 512KB • 1024KB

J.2 Connectivity

Function	Setting item	Default value	Allowed input
Add Host Group • FC/FCoE • iSCSI • SAS Add Host • FC/FCoE • iSCSI • SAS	Host Response	Default	• Solaris MPxIO • HP-UX • AIX EMPD • AIX VxVM • AIX Single Path • VS850/SVC • Host responses created in the ETERNUS DX Disk storage system • Default
Modify FC Port Parameters (When the port mode is "CA" or "CA/RA")	Connection	FC-AL	• Fabric • FC-AL
	Set Loop ID	Manual	• Manual • Auto
	Loop ID	When "Set Loop ID" is "Manual" • 0x0 When "Set Loop ID" is "Auto" • Ascending	When "Set Loop ID" is "Manual" • 0x0 – 0x7D When "Set Loop ID" is "Auto" • Ascending • Descending
	Transfer Rate	Auto-negotiation	• Auto-negotiation • 1 Gbit/s • 2 Gbit/s • 4 Gbit/s • 8 Gbit/s • 16 Gbit/s The available transfer rate varies depending on the CA type.
	Frame Size	2048	• 512 (bytes) • 1024 (bytes) • 2048 (bytes)
	Reset Scope	I_T_L	• I_T_L • T_L
	Release Reservation if Chip is Reset	Disable	• Enable • Disable
	REC Line No.	0	• 0 – 127 This item is displayed only when "Port Mode" is "CA/RA".

Function	Setting item	Default value	Allowed input
Modify FC Port Parameters (When the port mode is "CA" or "CA/RA")	REC Transfer Mode • Sync • Async Stack • Async Consistency • Async Through	Enable	• Enable • Disable This item is displayed only when "Port Mode" is "CA/RA".
Modify FC Port Parameters (When the port mode is "RA")	Connection	FC-AL	• Fabric • FC-AL
	Set Loop ID	Manual	• Manual • Auto
	Loop ID	When "Set Loop ID" is "Manual" • 0x0 When "Set Loop ID" is "Auto" • Ascending	When "Set Loop ID" is "Manual" • 0x0 – 0x7D When "Set Loop ID" is "Auto" • Ascending • Descending
	Transfer Rate	Auto-negotiation	• Auto-negotiation • 1 Gbit/s • 2 Gbit/s • 4 Gbit/s • 8 Gbit/s • 16 Gbit/s The available transfer rate varies depending on the CA type.
	Frame Size	2048	• 512 (bytes) • 1024 (bytes) • 2048 (bytes)
	REC Line No.	0	• 0 – 127
	REC Transfer Mode • Sync • Async Stack • Async Consistency • Async Through	Enable	• Enable • Disable

Function	Setting item	Default value	Allowed input
Modify FC Port Parameters (When the port mode is "Initiator")	Connection	FC-AL	• Fabric • FC-AL
	Set Loop ID	Manual	• Manual • Auto
	Loop ID	When "Set Loop ID" is "Manual" • 0x0 When "Set Loop ID" is "Auto" • Ascending	When "Set Loop ID" is "Manual" • 0x0 – 0x7D When "Set Loop ID" is "Auto" • Ascending • Descending
	Transfer Rate	Auto-negotiation	• Auto-negotiation • 1 Gbit/s • 2 Gbit/s • 4 Gbit/s • 8 Gbit/s • 16 Gbit/s The available transfer rate varies depending on the CA type.
	Frame Size	2048	• 512 (bytes) • 1024 (bytes) • 2048 (bytes)
	WWN (Port Name)	WWPN of the ETERNUS DX Disk storage system	• WWPN (16-digit hexadecimal)
	WWN (Node Name)	WWNN of the ETERNUS DX Disk storage system	• WWNN (16-digit hexadecimal)
Modify iSCSI Port Parameters (When the port mode is "CA")	IP Version	IPv4	• IPv4 • IPv6 • IPv4 / IPv6
	IP Address	192.168.xxx.xxx	• Up to 3 numeric characters • First text box 1 – 255 • Other text boxes 0 – 255
	Subnet Mask	255.255.255.0	• Up to 3 numeric characters • All text boxes 0 – 255
	IPv6 Link Local Address	Address that is obtained from the WWN of the ETERNUS DX Disk storage system	• fe80::xxxx:xxxx:xxxx:xxxx xxxx: 0 – ffff (FFFF) (hexadecimal, alphanumeric characters)
	TCP Port No.	3260	• 0 – 28671
	TCP Window Scale	2	• 0 – 14
	Congestion Control Option	Enable	• Enable • Disable

Function	Setting item	Default value	Allowed input
Modify iSCSI Port Parameters (When the port mode is "CA")	iSNS Server	Disable	• IPv4 • IPv6 • Disable
	iSNS Server Port No.	3205	• 0 – 65535
	iSCSI Name	iqn.2000-09.com.fujitsu:storage-system.eternus-*xxxx*:000*yyyyy* The default value varies depending on the factory setting. Refer to "The default value for "iSCSI Name"" (page 1043) for details.	• Alphabetic characters (lower case) and numeric characters • Symbols "-" (hyphen), "." (period), and ":" (colon) • The name starts with "iqn." or "eui." • 4 – 223 characters
	Jumbo Frame	Disable	• Enable • Disable
	VLAN ID	Disable (*) * When "VLAN ID" is "Enable", "0" is displayed as a default value in the text box.	• Enable • Disable When "VLAN ID" is "Enable" • 0 – 4095
	Reset Scope	I_T_L	• I_T_L • T_L
	Release Reservation if Chip is Reset	Disable	• Enable • Disable
	CmdSN Count	Unlimited	• Unlimited • 180 • 100 • 80 • 40 • 20
	CHAP	OFF	• ON • OFF
	Header Digest	OFF	• OFF • CRC32C
	Data Digest	OFF	• OFF • CRC32C

Function	Setting item	Default value	Allowed input
Modify iSCSI Port Parameters (When the port mode is "RA")	IP Version	IPv4	• IPv4 • IPv6 • IPv4 / IPv6
	IP Address	192.168.xxx.xxx	• Up to 3 numeric characters • First text box 1 – 255 • Other text boxes 0 – 255
	Subnet Mask	255.255.255.0	• Up to 3 numeric characters • All text boxes 0 – 255
	IPv6 Link Local Address	Address that is obtained from the WWN of the ETERNUS DX Disk storage system	• fe80::xxxx:xxxx:xxxx:xxxx xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
	TCP Port No.	3260	• 0 – 28671
	TCP Window Scale	2	• 0 – 14
	Congestion Control Option	Enable	• Enable • Disable
	iSCSI Name	iqn.2000-09.com.fujitsu:storage-system.eternus-*xxxx*:000*yyyyy* The default value varies depending on the factory setting. Refer to "The default value for "iSCSI Name"" (page 1043) for details.	• Alphabetic characters (lower case) and numeric characters • Symbols "-" (hyphen), "." (period), and ":" (colon) • The name starts with "iqn." or "eui." • 4 – 223 characters
	VLAN ID	Disable (*) * When "VLAN ID" is "Enable", "0" is displayed as a default value in the text box.	• Enable • Disable When "VLAN ID" is "Enable" • 0 – 4095
	MTU	1300	When "IP Version" is "IPv4" • 576 – 9000 (bytes) When "IP Version" is "IPv6" or "IPv4 / IPv6" • 1280 – 9000 (bytes)
	CHAP	OFF	• ON • OFF
	REC Line No.	0	• 0 – 127
	REC Transfer Mode • Sync • Async Stack • Async Consistency • Async Through	Enable	• Enable • Disable

Function	Setting item	Default value	Allowed input
Modify iSCSI Port Parameters (When the port mode is "CA/RA")	IP Version	IPv4	• IPv4 • IPv6 • IPv4 / IPv6
	IP Address	192.168.xxx.xxx	• Up to 3 numeric characters • First text box 1 – 255 • Other text boxes 0 – 255
	Subnet Mask	255.255.255.0	• Up to 3 numeric characters • All text boxes 0 – 255
	IPv6 Link Local Address	Address that is obtained from the WWN of the ETERNUS DX Disk storage system	• fe80::xxxx:xxxx:xxxx:xxxx xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
	TCP Port No.	3260	• 0 – 28671
	TCP Window Scale	2	• 0 – 14
	Congestion Control Option	Enable	• Enable • Disable
	iSNS Server	Disable	• IPv4 • IPv6 • Disable
	iSNS Server Port No.	3205	• 0 – 65535
	iSCSI Name	iqn.2000-09.com.fujitsu:storage-system.eternus-*xxxx*:000*yyyyy* The default value varies depending on the factory setting. Refer to "The default value for "iSCSI Name"" (page 1043) for details.	• Alphabetic characters (lower case) and numeric characters • Symbols "-" (hyphen), "." (period), and ":" (colon) • The name starts with "iqn." or "eui." • 4 - 223 characters
	VLAN ID	Disable (*) * When "VLAN ID" is "Enable", "0" is displayed as a default value in the text box.	• Enable • Disable When "VLAN ID" is "Enable" • 0 – 4095
	Reset Scope	I_T_L	• I_T_L • T_L
	Release Reservation if Chip is Reset	Disable	• Enable • Disable
	CmdSN Count	Unlimited	• Unlimited • 180 • 100 • 80 • 40 • 20

Function	Setting item	Default value	Allowed input
Modify iSCSI Port Parameters (When the port mode is "CA/RA")	MTU	When changing the port mode from "CA" to "CA/RA" • 1500 When changing the port mode from "RA" to "CA/RA" • 1300	When "IP Version" is "IPv4" • 576 – 9000 (bytes) When "IP Version" is "IPv6" or "IPv4 / IPv6" • 1280 – 9000 (bytes)
	CHAP (CA)	OFF	• ON • OFF
	CHAP (RA)	OFF	• ON • OFF
	Header Digest	OFF	• OFF • CRC32C
	Data Digest	OFF	• OFF • CRC32C
	REC Line No.	0	• 0 – 127
	REC Transfer Mode • Sync • Async Stack • Async Consistency • Async Through	Enable	• Enable • Disable
Modify iSCSI Port Parameters (When the port mode is "iSCSI-RA (for older storage system connection)")	IP Address	192.168.xxx.xxx	• Up to 3 numeric characters • First text box 1 – 255 • Other text boxes 0 – 255
	Subnet Mask	255.255.255.0	• Up to 3 numeric characters • All text boxes 0 – 255
	Transfer Rate	1 Gbit/s	• 1 Gbit/s • 100Mbit/s • Auto-negotiation
	MTU	1300bytes	• 1000bytes • 1050bytes • 1100bytes • 1150bytes • 1200bytes • 1250bytes • 1300bytes • 1350bytes • 1400bytes • 1438bytes
	Limit Band Width	400	• 10 – 400 (Mbit/s)

Function	Setting item	Default value	Allowed input
Modify iSCSI Port Parameters (When the port mode is "iSCSI-RA (for older storage system connection)")	CHAP	OFF	• ON • OFF
	REC Line No.	0	• 0 – 127
	REC Transfer Mode • Sync • Async Stack • Async Consistency • Async Through	Enable	• Enable • Disable
Modify iSCSI Port Parameters	Send Number	1	• 1 – 10 (Transmission count of the ping command)
Modify SAS Port Parameters	Transfer Rate	Auto-negotiation	• Auto-negotiation • 1.5 Gbit/s • 3 Gbit/s • 6 Gbit/s
	Reset Scope	I_T_L	• I_T_L • T_L
	Release Reservation if Chip is Reset	Disable	• Enable • Disable
Modify FCoE Port Parameters	Transfer Rate	10Gbit/s	• 10Gbit/s
	Set VLAN ID	Auto	• Auto • Fixed
	VLAN ID	0	• 0 – 4095
	Set Fabric Name	Auto	• Auto • Fixed
	Fabric Name	0	• WWN of FCoE (16-digit hexadecimal)
	Frame Size	2048	• 512 (bytes) • 1024 (bytes) • 2048 (bytes)
	Reset Scope	I_T_L	• I_T_L • T_L
	Release Reservation if Chip is Reset	Disable	• Enable • Disable
Add LUN Group	Number of LUNs	0	• 0 – 4096
	Start Host LUNs	The smallest LUN among the available LUNs	• 0 – 4095
	Number of LUNs	1	• 1 – 4096
Add Host Response	Byte-0 of Inquiry Response	No Conversion (Default)	• No Conversion (Default) • 0x7F Conversion mode • 0x20 Conversion mode

Function	Setting item	Default value	Allowed input
Add Host Response	Inquiry VPD ID Type	Type3 (Default)	• Type3 (Default) • Type1 • Type1 + Type3
	Inquiry Standard Data Version	Version 5 (Default)	• Version 5 (Default) • Version 4 • Version 3
	Command Timeout Interval	Default (25sec.)	• Default (25sec.) • Customize 10 – 255 (sec.)
	Load Balance Response	Unit Attention (Default)	• Unit Attention (Default) • Busy • Queue Full
	Reservation Conflict Response for Test Unit Ready	Normal (Default)	• Normal (Default) • Conflict
	Change Volume Mapping	No Report (Default)	• No Report (Default) • Report
	Volume Capacity Expansion	No Report (Default)	• No Report (Default) • Report
	Vendor Unique Sense Code	No Report (Default)	• No Report (Default) • Report
	Host Specific Mode	Normal (Default)	• Normal (Default) • AIX Mode • HP-UX Mode • NR1000V Mode • BS2000 Mode
	Asymmetric / Symmetric Logical Unit Access	For ETERNUS DX80 S2/DX90 S2, ETERNUS DX410 S2/DX440 S2, ETERNUS DX8100 S2 • ACTIVE-ACTIVE / PREFERRED_PATH (Default) For ETERNUS DX8700 S2 • ACTIVE / ACTIVE (Default)	For ETERNUS DX80 S2/DX90 S2, ETERNUS DX410 S2/DX440 S2, ETERNUS DX8100 S2 • ACTIVE-ACTIVE / PREFERRED_PATH (Default) • ACTIVE / ACTIVE For ETERNUS DX8700 S2 • ACTIVE-ACTIVE / PREFERRED_PATH • ACTIVE / ACTIVE (Default)
	iSCSI Discovery Reply Mode	All - Reply All Ports (Default)	• All - Reply All Ports (Default) • Port - Reply Target Port Only
	TPGS Mode	Enable (Default)	• Enable (Default) • Disable
	TPG Referrals	Disable (Default)	• Enable • Disable (Default)
	iSCSI Reservation Range	CA Port (Default)	• CA Port (Default) • Storage System

Function	Setting item	Default value	Allowed input
Add Host Response	Sense Data Conversion	No Conversion (Default)	• No Conversion (Default) • Customize
Modify CA Reset Group	Checkbox to select a port	All checkboxes are selected	• Selected Select the port • Cleared Do not select the port
Host-LU QoS	Operation mode	Disable	• Enable • Disable The Host-LU QoS function is disabled by default and only the [Enable Host-LU QoS] function is available.
Set FC/FCoE Host QoS Set iSCSI Host QoS Set SAS Host QoS	Bandwidth Limit	Unlimited	• Unlimited • 15000 IOPS (800 MB/s) • 12600 IOPS (700 MB/s) • 10020 IOPS (600 MB/s) • 7500 IOPS (500 MB/s) • 5040 IOPS (400 MB/s) • 3000 IOPS (300 MB/s) • 1020 IOPS (200 MB/s) • 780 IOPS (100 MB/s) • 600 IOPS (70 MB/s) • 420 IOPS (40 MB/s) • 300 IOPS (25 MB/s) • 240 IOPS (20 MB/s) • 180 IOPS (15 MB/s) • 120 IOPS (10 MB/s) • 60 IOPS (5 MB/s)
Set FC Port QoS Set iSCSI Port QoS Set SAS Port QoS Set FCoE Port QoS	Bandwidth Limit	Unlimited	• Unlimited • 27000 IOPS (1000 MB/s) • 21000 IOPS (850 MB/s) • 15000 IOPS (700 MB/s) • 10020 IOPS (600 MB/s) • 8040 IOPS (500 MB/s) • 6000 IOPS (400 MB/s) • 5040 IOPS (300 MB/s) • 4020 IOPS (250 MB/s) • 3000 IOPS (200 MB/s) • 2040 IOPS (160 MB/s) • 1020 IOPS (125 MB/s) • 720 IOPS (90 MB/s) • 480 IOPS (60 MB/s) • 240 IOPS (30 MB/s) • 120 IOPS (15 MB/s)

Function	Setting item	Default value	Allowed input
Add LU QoS Group	Bandwidth Limit	Unlimited	• Unlimited • 15000 IOPS (800 MB/s) • 12600 IOPS (700 MB/s) • 10020 IOPS (600 MB/s) • 7500 IOPS (500 MB/s) • 5040 IOPS (400 MB/s) • 3000 IOPS (300 MB/s) • 1020 IOPS (200 MB/s) • 780 IOPS (100 MB/s) • 600 IOPS (70 MB/s) • 420 IOPS (40 MB/s) • 300 IOPS (25 MB/s) • 240 IOPS (20 MB/s) • 180 IOPS (15 MB/s) • 120 IOPS (10 MB/s) • 60 IOPS (5 MB/s)

The default value for "iSCSI Name"

The default "iSCSI Name" varies depending on the factory setting. The setting for "iSCSI Name" is as follows:

iqn.2000-09.com.fujitsu:storage-system.eternus-*xxxx*:000*yyyyy*

- *xxxx*
  The following character strings are specified for each model.
  - For ETERNUS DX80 S2/DX90 S2
    dxl
  - For ETERNUS DX410 S2/DX440 S2
    dx400
  - For ETERNUS DX8100 S2/DX8700 S2
    dx8000
- *yyyyy*
  "Model ID + unique number" for WWN is specified.

J.3 System

Network Management

Function	Setting item	Default value	Allowed input
Setup Network Environment (When using IPv4)	Network Port	MNT	For ETERNUS DX80 S2/DX90 S2 • MNT • RMT For ETERNUS DX410 S2/DX440 S2, ETERNUS DX8100 S2/DX8700 S2 • MNT • RMT • FST
	Master IP Address	For ETERNUS DX80 S2/DX90 S2 • MNT port 192.168.1.1 For ETERNUS DX410 S2/DX440 S2, ETERNUS DX8100 S2/ DX8700 S2 • FST port 192.168.1.1	• Up to 3 numeric characters • All the text boxes 0 – 255
	Subnet Mask	For ETERNUS DX80 S2/DX90 S2 • MNT port 255.255.255.0 For ETERNUS DX410 S2/DX440 S2, ETERNUS DX8100 S2/ DX8700 S2 • FST port 255.255.255.0	• Up to 3 numeric characters • All the text boxes 0 – 255
	Speed and Duplex	Auto-negotiation	• Auto-negotiation • 1Gbit/s • 100Mbit/s Half • 100Mbit/s Full • 10Mbit/s Half • 10Mbit/s Full
	Wake on LAN	Disable	• Enable • Disable This item is displayed only when "Network Port" is "MNT" or "RMT".

Function	Setting item	Default value	Allowed input
Setup Network Environment (When using IPv6)	Network Port	MNT	For ETERNUS DX80 S2/DX90 S2 • MNT • RMT For ETERNUS DX410 S2/DX440 S2, ETERNUS DX8100 S2/DX8700 S2 • MNT • RMT • FST
Setup Firewall	HTTP	Selected	• Selected Enable the HTTP connection • Cleared Disable the HTTP connection
	HTTPS	Selected	• Selected Enable the HTTPS connection • Cleared Disable the HTTPS connection
	Telnet	Selected	• Selected Enable the Telnet connection • Cleared Disable the Telnet connection
	SSH	Selected	• Selected Enable the SSH connection • Cleared Disable the SSH connection
	ICMP	Selected	• Selected Enable the ICMP connection • Cleared Disable the ICMP connection
	Maintenance-Secure	Selected	• Selected Enable the Maintenance-Secure connection • Cleared Disable the Maintenance-Secure connection
	SNMP	Selected	• Selected Enable the SNMP connection • Cleared Disable the SNMP connection
	RCIL	Cleared	• Selected Enable the RCIL connection • Cleared Disable the RCIL connection Whether RCIL is enabled or disabled is only displayed when "Network Port" is "MNT".

Function	Setting item	Default value	Allowed input
Setup SNMP Agent Basic Interface	SNMP Function	Disable	• Enable • Disable
	LAN Port used for SNMP	MNT	• MNT • RMT
	Authentication Failure	Send SNMP Trap	• Send SNMP Trap • Do not send SNMP Trap
	Engine ID	Default	• Default • Customize Allowed input when "Customize" is selected - Alphanumeric characters (0 – 9, A – F, a – f) - Inputting only "0" or "F" for the "Engine ID" field is not allowed - 10 - 64 characters (even number)
	MIB-II RFC Version	RFC1213	• RFC1213 • RFC4293
Setup SNMP Manager	IP Version	IPv4	• IPv4 • IPv6
Setup SNMP Agent MIB Access View	Subtree1 - Subtree10	Inclusion	• Inclusion • Exclude
Setup SNMP Agent User	MIB View Setting	ViewALL	• ViewALL • View-mib2 • View-exmib • View name that is registered in "11.2.3.5 Setup SNMP Agent MIB Access View" (page 766). When accessing the MIB is not allowed • Blank If "ViewALL", "View-mib2", or "View-exmib" is deleted in "11.2.3.5 Setup SNMP Agent MIB Access View" (page 766), the deleted options are not displayed in the "MIB View Setting" field.
	Authentication	Disable	• Enable • Disable
	Authentication Method	MD5	• MD5 • SHA
	Encryption	Disable	• Enable • Disable

Function	Setting item	Default value	Allowed input
Setup SNMP Agent Community	View Name	ViewALL	• ViewALL • View-mib2 • View-exmib • View name that is registered in "11.2.3.5 Setup SNMP Agent MIB Access View" (page 766). When accessing the MIB is not allowed • Blank If "ViewALL", "View-mib2", or "View-exmib" is deleted in "11.2.3.5 Setup SNMP Agent MIB Access View" (page 766), the deleted options are not displayed in the "View Name" field.
	Allowed SNMP Manager List	Cleared	• Selected The SNMP Manager is allowed to access • Cleared The SNMP Manager is not allowed to access If the Allowed SNMP Manager List has been left blank, all of the SNMP Managers are allowed to access.
Setup SNMP Agent Trap	Manager No.	Manager01	• Manager01 – Manager10
	SNMP Version	v1	• v1 • v2c • v3
	Community Name	The community name that is displayed at the top of the list box.	The community name that is registered using the [Setup SNMP Agent Community] function.
	User Name	The user name that is displayed at the top of the list box.	The user name that is registered using the [Setup SNMP Agent User] function.
	Port No.	162	• Numeric characters 1 – 65535
Download MIB File	Option (The ServerView control code is added to the comment line of the MIB definition file)	Cleared	• Selected Download the MIB file with the ServerView control code • Cleared Download the MIB file without the ServerView control code
	Version	v1	• v1 • v2c/v3

Function	Setting item	Default value	Allowed input
Setup E-Mail Notification (Notification E-Mail)	Notification E-Mail	No	• Yes • No
Setup E-Mail Notification (Mail Server Settings)	LAN Port used for SMTP Connection	MNT	• MNT • RMT
	SMTP Port No.	25	• Numeric characters 1 – 65535
	SMTP requires authentication	None	• None • AUTH SMTP
	Authentication Method	Automatic	• Automatic • CRAM-MD5 • PLAIN • LOGIN
Setup E-Mail Notification (Retry Setting)	Maximum Retries	0	• 0 • 1
	Retry Interval	1	• Numeric characters 1 – 5 (sec.)
Setup Syslog	Send Log	off	• on (RFC3164) • on (RFC5424) • off
	Port No.	514	• Numeric characters 1 – 65535
	LAN Port	MNT	• MNT • RMT
Setup SSH Server Key	Key Length	2048 bit	• 1024 bit • 2048 bit • 4096 bit
	SSH v1	Enable	• Enable • Disable
Create Self-signed SSL Certificate	Key Length	2048 bit	• 1024 bit • 2048 bit • 4096 bit
Create Key/CSR	Key Length	2048 bit	• 1024 bit • 2048 bit • 4096 bit

Remote Support (REMCS) for Regions other than EMEA

Function	Setting item		Default value	Allowed input
Setup Remote Support	Customer Information	Checkbox (Delete any Customer Identity information from the storage system after the information is sent to the 'REMCS Center'.)	Cleared	• Selected The customer information saved on the ETERNUS DX disk storage system is deleted after transmitting the information to the REMCS center. • Cleared The customer information saved on the ETERNUS DX disk storage system is retained after transmitting the information to the REMCS center.
		Country of Installation (ISO3166 A2)	When logged with "Japanese" as the selected language • JP When logged with "English" as the selected language • Blank	• Two fixed letters • Capital letters or "99"
		Installation Date	2001-01	YYYY-MM • Numeric characters • 2001 - 2037 Year (YYYY) • 01 – 12 Month (MM)
	Communication Environment Information	Connection Type	Internet Connection	• Internet Connection • Internet Connection (Mail only) • P-P Connection • P-P Connection (Mail only) • P-P Connection (VPN Connection) • P-P Connection (VPN Connection Mail only)
		LAN Port used for Remote Support	MNT	• MNT • RMT

Function	Setting item		Default value	Allowed input
Setup Remote Support	Communication Environment Information	Scheduled Connection Time	Undefined	Hour : Minute • Numeric characters • 00 - 23 Hour • 00 - 59 Minute • Undefined (10:00 - 15:00) Different times are specified in the factory settings.
		Scheduled Connection Period	Every Day	• Every Day • Every Day (except Sunday) • Every Day (except Saturday and Sunday) • Once per Week
		Specify the Day of the Week	Sunday	• Sunday • Monday • Tuesday • Wednesday • Thursday • Friday • Saturday
		Port No. (Proxy Server)	0	• Numeric characters 0 – 65535
		Port No. (SMTP Server)	25	• Numeric characters 0 – 65535
		Authentication Type	No SMTP Authentication	• No SMTP Authentication • POP Before SMTP Authentication • AUTH SMTP Authentication
		Authentication Method	Automatic	• Automatic • CRAM-MD5 • PLAIN • LOGIN
		Port No. (POP Server)	110	• Numeric characters 0 – 65535

Function	Setting item		Default value	Allowed input
Setup Remote Support	Communication Environment Information	REMCS Center	Blank	• Blank • Fujitsu America • Australia • Brazil • Hong-Kong • China • Indonesia • Korea • Malaysia • Philippine • Singapore • Taiwan • Thailand • Vietnam • Individual support in Hawaii • OSC • Direct Input Setting
	Detailed Configuration Information	Data Transmission Method	Split	• Split • Do not Split
			When "Split" is selected • Split large data into multiple E-mails 512KB	When "Split" is selected • Split large E-mail into multiple E-mails 64 – 6400KB • Split large data into multiple E-mails 64 – 512KB
		Specify Storage System Name for HELO/EHLO Announcement when Sending Mail	Do not specify	• Specify • Do not specify
	Result notification information	Administrator	Notification	• Notification • Not Notification
		Connection check operator	Not Notification	• Notification(Standard E-Mail format) • Notification(Simple E-Mail format for cell phone) • Not Notification

Function	Setting item		Default value	Allowed input
Setup Remote Support	Time Information	SMTP Response Timeout (sec.)	60	• Numeric characters 1 – 3600
		SMTP Retry Count	5	• Numeric characters 1 – 60
		SMTP Retry Interval (sec.)	30	• Numeric characters 1 – 3600
		HTTP Timeout (sec.)	30	• Numeric characters 1 – 3600
		HTTP Retry Count	5	• Numeric characters 1 – 60
		HTTP Retry Interval (sec.)	5	• Numeric characters 1 – 3600
		Queue Time before Sending Mails (msec.) (only when POP Before SMTP authentication is enabled)	1000	• Numeric characters 1 – 3600
Setup Log Sending Parameters (Configure Automatic Log Transmission)	Send Log when Errors Occur		When the Remote Support setting has not been completed • Cleared When the Remote Support setting has been completed • Selected	• Selected Send log when errors occur • Cleared
	Periodical Transmission of Log		When the Remote Support setting has not been completed • Cleared When the Remote Support setting has been completed • Selected	• Selected Send log periodically • Cleared
	Time		Undefined	• Numeric characters • 00 - 23 Hour • 00 - 59 Minute • Undefined (10:00 - 15:00) Different times are specified for each ETERNUS DX Disk storage system in the factory settings.
	Period		Once per Week	• Once per Week • Everyday

Function	Setting item	Default value	Allowed input
Setup Log Sending Parameters (Configure Automatic Log Transmission)	Day of the Week	Undefined	• Sunday • Monday • Tuesday • Wednesday • Thursday • Friday • Saturday • Undefined (Any day from Monday to Friday) Different days are specified for each ETERNUS DX Disk storage system in the factory settings
Setup Log Sending Parameters (Immediately Send Log Manually)	Include I/O Module log	Yes	• Yes • No
	Time Range Specified	Cleared	• Selected Specify the time range • Cleared

Remote Support (AIS Connect) for Regions other than Japan

Function	Setting item	Default value	Allowed input
Setup AIS Connect Environment	AIS Connect	Disable	• Enable • Disable
	Use LAN Port	MNT	• MNT • RMT
	SSL Server Certification	Enable	• Enable • Disable
	Auto Send Log	Disable	• Enable • Disable
	Connection Type	HTTP	• HTTP • SOCKS
	Change Password	Cleared	• Selected Change the password • Cleared Do not change the password
Setup Remote Session Permission	Remote Session	Forbid	• Permit • Forbid
	Remote Session Timeout	1 hour	• 1 – 24 hour • Unlimited
Add Key Server	Port No.	5696	• Numeric characters 1 – 65535
	LAN Port	MNT	• MNT • RMT

Function	Setting item		Default value	Allowed input
Create Key Group	Security Level		High	• High • Low
	Recovery Mode		Auto	• Auto • Manual
	Key Valid Period		Unlimited	• Unlimited • 1 month – 12 month
	Key Server	Master	None	• None • 1 • 2
		Slave	None	
Update SED Authentication Key	Current Key		Enabled Key	• Enabled Key • Disabled Key

Define Role

Function	Setting item	Default value	Allowed input
Setup User Account	User Role	Monitor	• Monitor • Admin • StorageAdmin • AccountAdmin • SecurityAdmin • Maintainer • Software • Custom role
	Account	Enable	• Enable • Disable
Modify RADIUS	RADIUS Authentication	Disable	• Enable • Disable
	Recovery Mode	Yes (Communication error / Authentication error)	• Yes (Communication error / Authentication error) • Yes (Communication error) • No
	Port No.	1812	• Numeric characters 1 – 65535
	LAN Port	MNT	• MNT • RMT
	Authentication Mode	CHAP	• CHAP • PAP

Function	Setting item	Default value	Allowed input
Modify RADIUS	Retry Out Time	30	• 10 • 20 • 30 • 40 • 50 • 60
Add Role	Policies • Status Display • RAID Group Management • Volume - Create / Modify • Volume - Delete / Format • Host Interface Management • Advanced Copy Management • Copy Session Management • Storage Migration Management • Storage Management • User Management • Authentication / Role • Security Setting • Maintenance Information • Maintenance Operation	All cleared	• Selected Set the policy • Cleared Do not set the policy

ECO Mode Management

Function	Setting item		Default value	Allowed input
Modify ECO Mode General Setting	ECO Mode		Disable	• Enable • Disable
Create ECO Mode Schedule	Event Type		everyday	• everyday • Every week • Specific days • Specific week
	Event Type	everyday	From Time • 00:00 To Time • 00:00	From Time • 00:00 – 23:30 (Can be specified at intervals of 30 minute) To Time • 00:00 – 23:30 (Can be specified at intervals of 30 minute)

Function	Setting item		Default value	Allowed input
Create ECO Mode Schedule	Event Type	Every week	Period (start day) • Monday Period (end day) • Monday From Time • 00:00 To Time • 00:00	Period (start day) • Monday – Sunday Period (end day) • Monday – Sunday From Time • 00:00 – 23:30 (Can be specified at intervals of 30 minute) To Time • 00:00 – 23:30 (Can be specified at intervals of 30 minute)
		Specific days	Month • Every Month Period (start date) • 01 Period (term) • One day only From Time • 00:00 To Time • 00:00	Month • Every Month, January - December Period (start date) • 01 - 31 Period (term) • One day only, 2 days - 7 days From Time • 00:00 – 23:30 (Can be specified at intervals of 30 minute) To Time • 00:00 – 23:30 (Can be specified at intervals of 30 minute)
		Specific week	Month • Every Month Period (nth week) • 1st Period (start day) • Monday Period (end day) • Monday From Time • 00:00 To Time • 00:00	Month • Every Month, January - December Period (nth week) • 1st – 4th, Last Period (start day) • Monday – Sunday Period (end day) • Monday – Sunday From Time • 00:00 – 23:30 (Can be specified at intervals of 30 minute) To Time • 00:00 – 23:30 (Can be specified at intervals of 30 minute)

Event/Dump Management

Function	Setting item	Default value	Allowed input
Setup Event Notification	Setting based on Severity	Refer to "System Defaults" (page 888) in "11.2.9.1 Setup Event Notification" (page 880) for details.	• Selected (normal checkbox) Notify all events • Selected (lighter colored checkbox) Some events are notified and some events are not notified • Cleared No events are notified • - Not applicable to notification
	• Error Severity Level • Warning Severity Level • Informational Level		• Selected Notify • Cleared Not notify • - Not applicable to notification
Export/Delete Log	Specify Time Range	No	• Yes • No • Last 24 hours
	Include I/O Module log	Yes	• Yes • No
	Log File Size	Non-segmentation	• Non-segmentation • 4.27MB • 1.44MB (Floppy Disk) • 640KB (E-Mail)
	Delete of Customer Information	No	• Yes • No
Export Panic Dump	Panic Dumps	Cleared	• Select Export the panic dump • Cleared Do not export the panic dump
	Dump File Segment Size	Non-segmentation	• Non-segmentation • 4.27MB • 1.44MB (Floppy Disk) • 640KB (E-Mail)

Audit Log Management

Function	Setting item	Default value	Allowed input
Audit Log	Operation mode	Disable	• Enable • Disable The Audit Log function is disabled by default and only the [Enable Audit Log] function can be performed.
Setup Audit Log	Send Audit Log	off	• on (RFC3164) • on (RFC5424) • off
	Port No.	514	• Numeric characters 1 – 65535
	LAN Port	MNT	• MNT • RMT

Utility Management

Function	Setting item	Default value	Allowed input
Backup Configuration	Select Configuration Definition	Configuration(Latest)	• Configuration(Latest) • Configuration(1 time before) • Configuration(2 times before)
	Select Backup Slot	Backup #1	• Backup #1 • Backup #2 • Backup #3 • Backup #4
Start/Stop Performance Monitoring	Interval (sec.)	30	• 30 – 300 (Can be specified at intervals of 30 minute)

System Management

Function	Setting item	Default value	Allowed input
Modify Date and Time	Date	Current date and time (When the ETERNUS DX Disk storage system is installed in Japan, the local time for Japan is displayed)	YYYY-MM-DD hh:mm:ss • Numeric characters • 2001 - 2037 Year (YYYY) • 01 – 12 Month (MM) • 01 – 31 Date (DD) • 00 – 23 Hour (hh) • 00 – 59 Minute (mm) • 00 – 59 Second (ss)
	Time Zone	When the ETERNUS DX Disk storage system is shipped from Japan and shipped to Japan • (GMT+09:00) Tokyo, Osaka, Kyoto, Fukuoka, Sapporo When the ETERNUS DX Disk storage system is shipped from Japan to regions other than Japan • (GMT+00:00) Dublin, London, Manchester, Lisbon * The default value depends on the shipment information	• Refer to "Allowed input for "Time Zone"" (page 1063)

Function	Setting item		Default value	Allowed input
Modify Date and Time	Time Zone (time difference setting)		When selecting "Manually" in the "Time Zone" field • + 00 : 00	When selecting "Manually" in the "Time Zone" field • +/- Time difference • 00 – 12 Hour • 00,15, 30, 45 Minute
	Daylight Saving Time	Set	OFF	• ON • OFF
		Range (by day of the week)	• Start January 1st Sunday 00 : 00 • End January 1st Sunday 00 : 00	• January – December Month • 1st – 4th, Last Week • Monday – Sunday Day of the week • 00 – 23 Hour
		Range (by Date)	• Start January 01 00 : 00 • End January 01 00 : 00	• January – December Month • 01 – 31, Last Day Date • 00 – 23 Hour
	NTP Service	NTP server	NTP disabled	• NTP enabled • NTP disabled
		LAN Port used for NTP	MNT	• MNT • RMT
Change Box ID	Box ID		Device ID	A combination of 1 to 40 of the following characters. • Capital letters • Numeric characters • Spaces • "#" (hash keys)

Function	Setting item		Default value	Allowed input
Setup Subsystem Parameters	Load Balance		Enable	• Enable • Disable
	Reject INQUIRY from Unauthorized Host		Disable	• Enable • Disable
	Thin Provisioning Allocation Mode		TPP balancing	• TPP balancing • TPV balancing
	Cache Mirroring		When the "Change" checkbox is cleared • Enable	• Enable • Disable When changing the setting "Change" checkbox • Selected Change the settings • Cleared The value returns to the previous state when this function is first started.
	Checkcode Enforcement		Disable	• Enable • Disable
	I/O Offloading		When the ETERNUS DX Disk storage system is shipped • Enable When the firmware version is updated to "V10L50" or later • Disable	• Enable • Disable
	Web GUI Settings	Function to Add Host	"Use "Add Host Group"" checkbox • Selected "Use "Add Host"" checkbox • Cleared	Use "Add Host Group" • Selected Use "Add Host Group" function • Cleared Do not use "Add Host Group" function Use "Add Host" • Selected Use "Add Host" function • Cleared Do not use "Add Host" function
Setup Encryption Mode	Encryption Mode		Disable	• Disable • Fujitsu Original • AES

Function	Setting item		Default value	Allowed input
Setup SMI-S Environment	SMI-S		When the ETERNUS DX Disk storage system is shipped to EMEA region • Enable When the ETERNUS DX Disk storage system is shipped to regions other than EMEA • Disable	• Enable • Disable
Setup Power Management	Enable		Cleared	• Selected Enable the power management by an external input device • Cleared Disable the power management by an external input device
	Auto Power		Disable	• Enable • Disable
	Power Resume		Disable	• Enable • Disable
	For ETERNUS DX80 S2/DX90 S2	Delay until Shutdown (min.)	0	• 0 – 15
		Set management unit interface	PMAN	• Power Synchronized Unit • PMAN • Manual
		Power Failure Signal	Positive	• Positive • Negative
		Low Battery Signal	Positive	• Positive • Negative
		UPS Shutdown Signal	Cleared	• Selected Enable the UPS shutdown signal • Cleared Disable the UPS shutdown signal
			When "UPS Shutdown Signal" is enabled • Positive	• Signal logic when "UPS Shutdown Signal" is enabled • Positive • Negative

Allowed input for "Time Zone"

Select the time zone from the following;

- (GMT-12:00) Eniwetok, Kwajalein
- (GMT-11:00) Samoa
- (GMT-10:00) Honolulu
- (GMT-09:00) Alaska
- (GMT-08:00) Los Angeles, San Francisco, San Diego
- (GMT-07:00) Phoenix, Calgary, Denver
- (GMT-06:00) Chicago, Mexico City
- (GMT-05:00) New York, Bogota
- (GMT-04:00) Caracas
- (GMT-03:30) Newfoundland
- (GMT-03:00) Sao Paulo, Brasilia
- (GMT-02:00) Mid-Atlantic
- (GMT-01:00) Azores Island, Cape Verde
- (GMT+00:00) Dublin, London, Manchester, Lisbon
- (GMT+01:00) Paris, Madrid, Stockholm
- (GMT+01:00) Rome, Vienna, Berlin
- (GMT+01:00) Milan, Amsterdam
- (GMT+02:00) Athens, Helsinki, Cairo
- (GMT+02:00) Beirut, Cape Town
- (GMT+03:00) Nairobi, Moscow
- (GMT+04:00) Abu Dhabi
- (GMT+05:00) Islamabad, Karachi
- (GMT+05:30) New Delhi
- (GMT+06:00) Dhaka
- (GMT+07:00) Bangkok, Jakarta
- (GMT+08:00) Hong Kong, Manila, Singapore
- (GMT+08:00) Beijing, Taipei, Kuala Lumpur, Perth
- (GMT+09:00) Tokyo, Osaka, Kyoto, Fukuoka, Sapporo
- (GMT+09:00) Seoul
- (GMT+09:30) Adelaide
- (GMT+10:00) Guam, Sydney, Melbourne
- (GMT+11:00) Solomon Islands, New Caledonia
- (GMT+12:00) Wellington, Auckland, Fiji
- Manually

Appendix K
Error Code

The error codes for copy sessions are described below.

Error code	Description
0x10 – 0x1F	An error that is caused by a copy source volume occurs. Some copy source volumes cannot be accessed because a failure has occurred in a component (e.g. drives and drive enclosures).
0x20 – 0x2F	An error that is caused by a copy destination volume occurs. Some copy destination volumes cannot be accessed because a failure has occurred in a component (e.g. drives and drive enclosures).
0x30 – 0x3F	An error that is caused by an REC path occurs. The error location (Suspected Spot) is displayed in the "Detail Information" field on the [Copy Path] screen. Refer to "8.1.6.2 Copy Path" (page 271) for details.
0xBA	A bad sector is detected.
0xBB	SDV/SDP capacity is insufficient.
0xBD	Overload status is detected in a copy destination volume or a copy destination storage system.
0xBE	A line has failed. Data is stored in the REC Buffer. This error is displayed only when the "Type" is "REC".
0xBF	A line has failed. Data is stored in the REC Disk Buffer. This error is displayed only when the "Type" is "REC".
Other than above	An error other than the ones listed above occurs.

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